

TECHNOLOGY DEPARTMENT

The

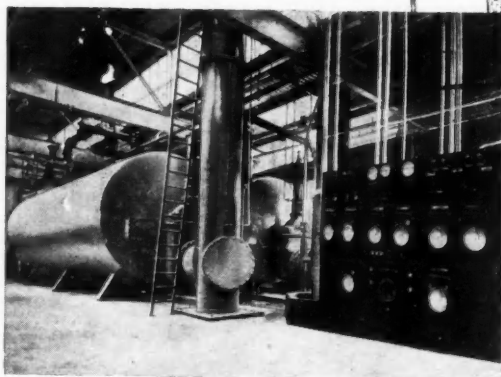
# Chemical Age

VOL LXII

18 FEBRUARY 1950

No 1597

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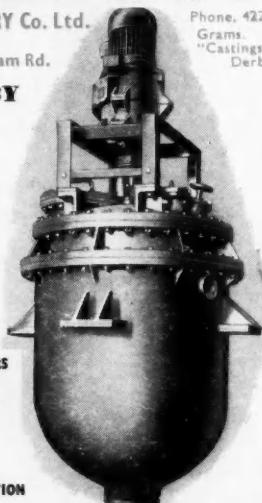
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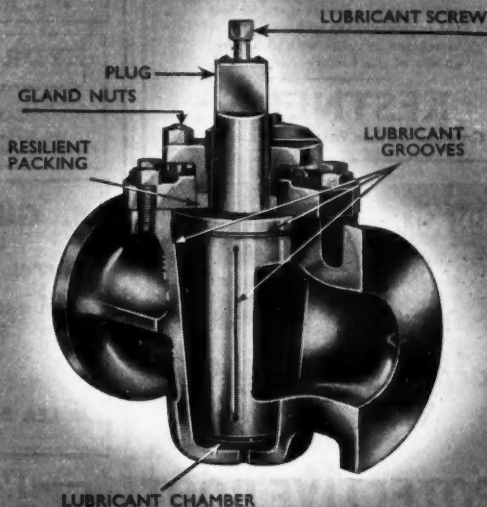
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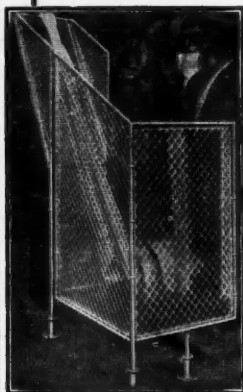
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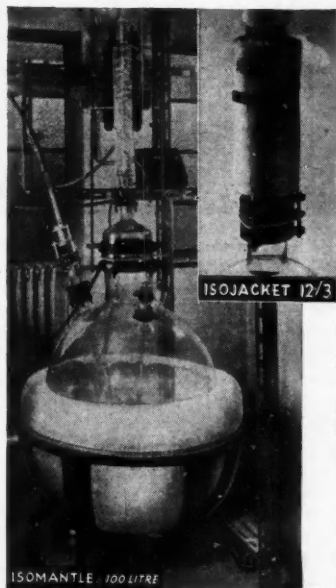
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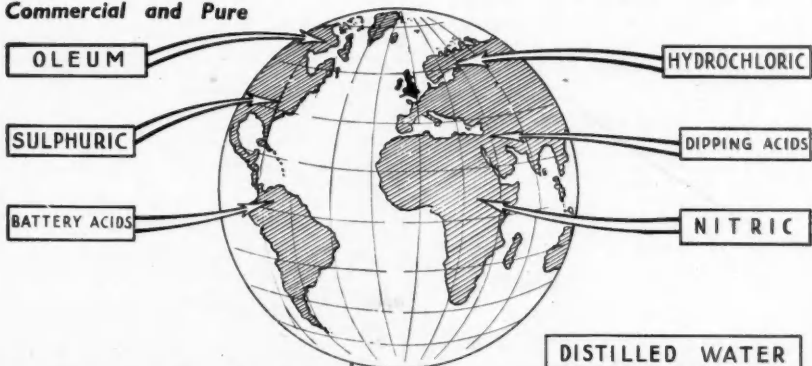
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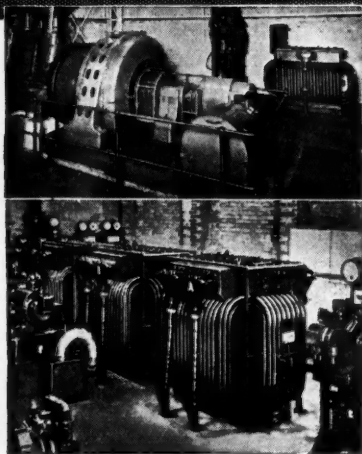
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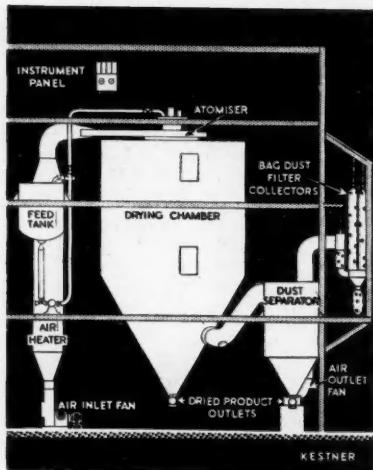
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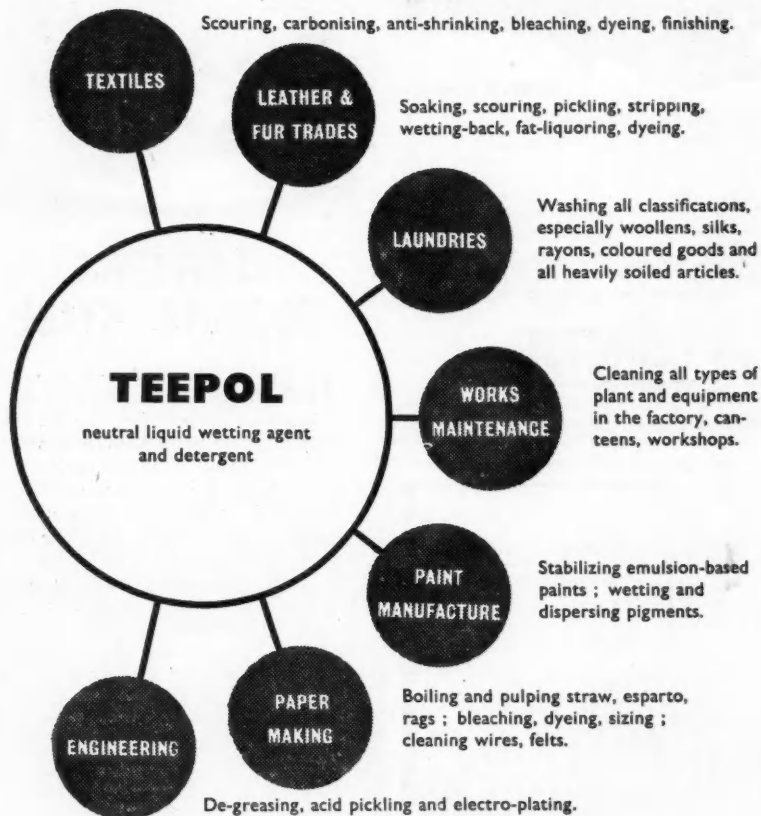
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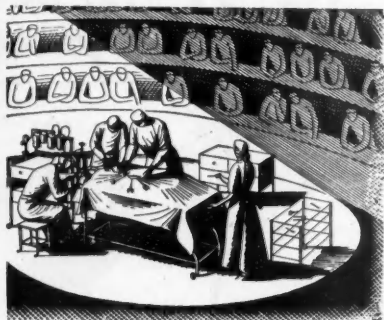


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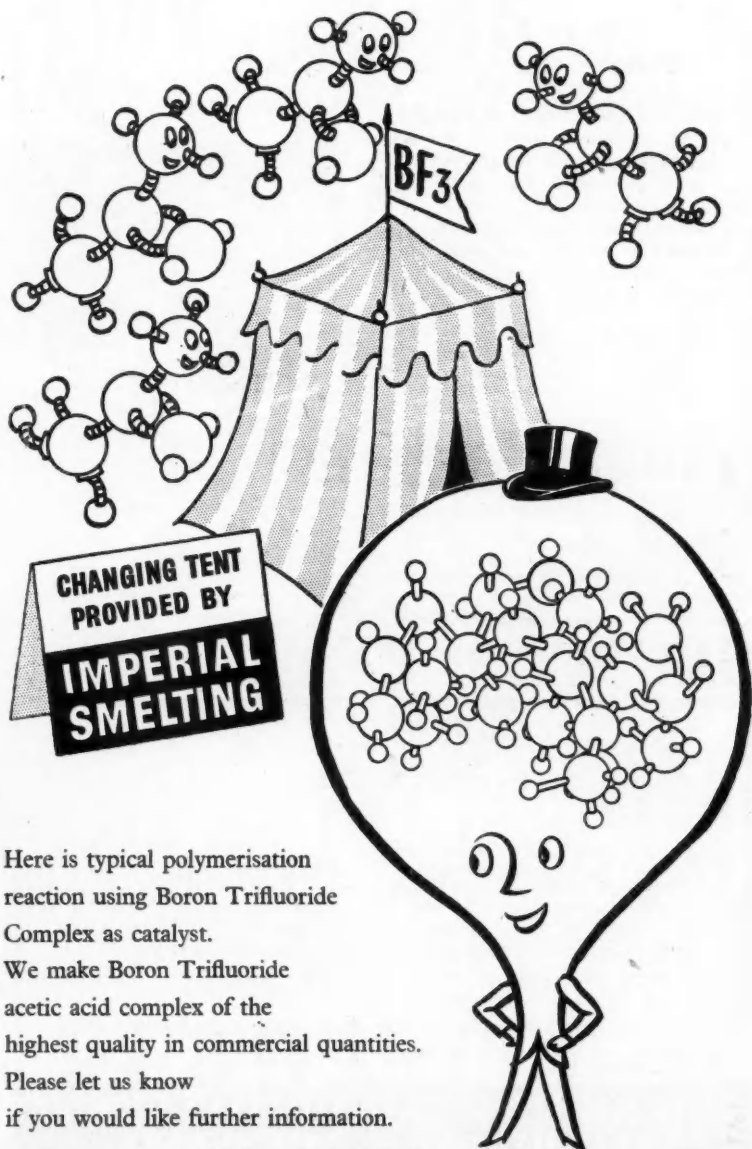
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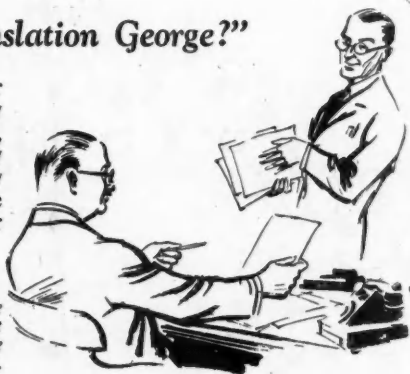
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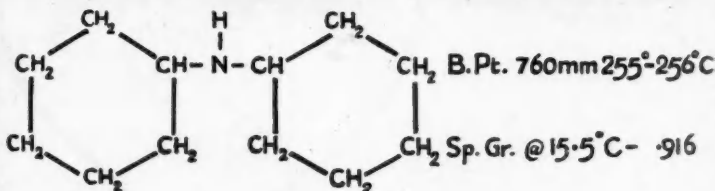


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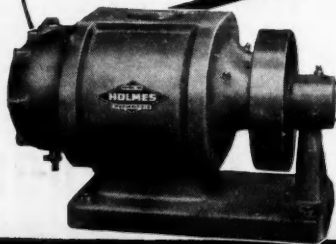
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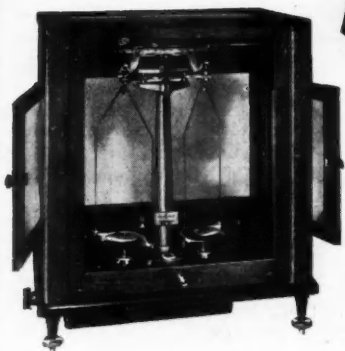
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The Weekly Journal of Chemical Engineering and Industrial Chemistry

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Volume LXII

18 February 1950

Number 1597

## Training Chemical Engineers

THE present year gives promise of bringing more progress than any of its predecessors in the urgently needed expansion of training facilities for chemical engineers. The most remarkable thing in this connection is not so much that the long desired concentration of interests is now beginning to produce results as the unconscionably long time that was required to bring it about. The need for more men adequately trained in chemical engineering principles was conspicuous almost as soon as the conversion of industries to peacetime production got under way. The principal educational centres, faced with demands possibly of equal urgency from other quarters, have been slow in providing facilities. Cambridge University was more alert to the need than were most others; Manchester, where the need for chemical engineers is very much a local problem, is still without a Chair of Chemical Engineering.

Now that the neglected topic is receiving the attention it deserves the accumulated shortcomings of the past are exacting a penalty. As a preliminary to formulating an educational programme on a national scale it has been necessary to carry out a far-reaching investigation of basic needs

and facilities. One of the more obvious preliminaries was to determine how many chemical engineers constitute the minimum needs of industry in the next few years. The Technical Personnel Committee of the Ministry of Labour, under the chairmanship of Lord Hankey, has been examining the present and future demand for professionally qualified chemical engineers and the report of this committee is one of those to be issued in the next group of publications on "The Present and Future Supply and Demand for Persons with Professional Qualifications."

One of the more encouraging factors in the gradual approach to a sufficiency of trained people is the active interest which has been displayed by the technical colleges. There the general objective has been the creation of chemical engineering courses of a non-degree character and the policy has derived useful stimulus from the Ministry of Education's recognition of the need to make chemical engineering studies available to the national certificate type of student. A welcome manifestation of that policy has been the establishment of a department of chemical engineering at the City and Guilds College.

These things are indicative of the

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changed attitude of the Government towards technologists. Due to the inadequate supply of young chemists and technologists from universities, colleges and polytechnics, large firms have been obliged to train their own staff—a policy which offers many advantages though it does perhaps tend towards narrow specialisation.

All such schemes, necessary as they are, fall short of the main target; but they indirectly serve the same purpose by providing staff to relieve the demand made upon the time of more highly qualified practitioners. They provide, in addition, a starting point from which the best candidates for further training may go on to join the attenuated ranks of the higher command.

An increasing number of universities fortunately have now seen the need to inaugurate courses in chemical engineering. Facilities for the higher training of post-graduates are being made available not only for those aspiring to the higher degrees, and specialising in research, but also for men who have gained the usual degrees and wish to extend their training. These courses are designed not only to give a graduate a wider knowledge of his special subject, but

also to afford some training in other fields closely allied to his own. Thus the mechanical engineer with a degree might study mining and the chemist or physicist might be given a course in metallurgy. In this way the dangers of over-specialisation can be avoided or minimised, and for the chemical engineer these facilities should be especially valuable.

None of these factors, however, can disguise the fact that a considerable period must elapse before the shortage of chemical engineers can be finally disposed of. Buildings will have to be erected and equipped, and a much more difficult problem is presented by the limited number of qualified teachers likely to be available. In other fields of engineering a suitable proportion of the graduates have become attached to the staffs of universities or technical colleges; others have subsequently found their way back to the universities, bringing with them the valuable asset of their industrial experience. Existing chairs are filled by men of the highest qualifications, but the very fact that chemical engineers have not hitherto been produced in sufficient numbers may result in a shortage of teachers when additional facilities have been established.

## Notes and Comments

### Enlightened View

NOTHING could be more welcome than evidence that trade union organisers at large had been convinced that the need for full and uninterrupted production outweighed some partisan policies which have been pursued in the past. The paucity of evidence of that kind makes doubly interesting the unorthodox faith represented in a special article in the current number of the *I.C.I. Magazine* by Mr. Alfred Stott. Mr. Stott, a shop steward in the Nobel Division of I.C.I., invites his fellow trade unionists to admit that the oppressive mill-owner of the past (top hatted, with whip in hand if the cartoons are any evidence) is at the moment about as serious a problem as is the dinosaur. He asks:—

“Can a reconciliation between Boss and Worker be effected? If so, how can it be brought about? Certainly not by fear and suspicion, nor by prejudice or by conceding nothing. If we, the workers, were prepared to put something into the kitty, that would be an excellent send-off. To reconcile Boss and Worker we must form our works council and see that our representatives are kept up to scratch. Views can be aired and if there is something which to us, as workers, seems absurd and it is explained by those in authority, then many suspicions can be removed.

“Then we come to the profit motive. What we really mean is profiteering. There is a tremendous difference between the two. Could any ordinary British workman be content at his job if he was working for a firm that did not make a profit? Does not a worker go to work in order to make a profit?”

Self-evident facts of this kind, it seems, can be appreciated by a shop steward but not by Cabinet Ministers.

### Rubber Research

MUCH of the history of contemporary uses of rubber is being recalled by the current commemoration of 30 years' very active work by the Research Association of the British Rubber Manufacturers. When the

Association might have been celebrating its silver jubilee its urgent wartime preoccupations with such things as substitutes for the synthetic Buna rubber which had been drawn from Germany and a host of similar demands presented by warfare in which rubber played at least as vital a part as did high explosives made celebrations impossible. In “Thirty Years of Rubber Research” the association's passing references to the themes and achievements of its investigations of such subjects as synthetic and silicone rubbers, sulphur, carbon blacks, organic accelerators and antioxidants, softeners and plasticity bring a fresh realisation of the relative novelty of much of the body of rubber science and technology—and of the vital contribution that it has made to everyday things. Confirmation of that was found in an industrial demonstration in London this week which recalled that a substance as familiar and useful as latex rubber is still relatively a newcomer. Both these surveys point unmistakably to the fact that the subject of rubber compounding and uses now calls for research on a much wider front than when the association made its tentative approach to co-operative industrial research, largely in the interests of tyre manufacturers, in 1920. The functions and qualities of carbon blacks would alone fill one large research programme.

### Simplification

INSECTICIDES and like chemicals, whose names are scarcely pronounceable even by the specialists who produce them, usually acquire proprietary names which, although they can be articulated and memorised fairly easily, do not convey to the user the basic characteristics of the product. The efforts of a newly formed technical committee of the British Standards Institution to devise simple common names for pest control

products should therefore receive the warm support of agriculturalists and no less of the interests which want to see the products popularised. The BSI has sensibly decided to give "the interested public" the opportunity to assist by suggesting names for established products or submitting information about new ones which require names. The makers of the new systemic insecticide did well to choose the crisp name. Pestox 3, to identify his (his dimethylaminophosphonous) anhydride ( $C_2H_5O_2N_2P_2$ ). But trade names are not the appropriate form for international documentation. The subject as a whole would seem a heaven-sent opportunity for the lover of acrostics to show his skill. The subject of simplification leads one irresistibly into other fields where complex names baffle the memory and invite the use of cryptic strings of initials. Perhaps someone could suggest an alternative name for the BSI's Technical Committee for Nomenclature of Pest Control Products, or for its Pest Control Products Industry Standards Committee?

### Not So "Hot" Laboratories

THE radioactive by-products of atomic energy, "radioisotopes", will play a great part in the future of many industries. The U.S.A. is the source of that forecast and the general approach to the subject there indicates that there are good reasons to expect that its realisation will not be long deferred. The U.S. Atomic Energy Commission is currently providing a liberal supply of information in the interests of industries, of which the most recent examples have been the papers presented before the American Society of Mechanical Engineers, by Paul Aebersold, head of the isotopes division, and others. The policy of educating industries to use radioactive isotopes with safety is manifested in the study of safe handling (G. G. Manov and D. G. Linz) which, while not minimising the destructive possibilities, strongly suggests that even high-energy radioactive tracer ma-

terials need present little more risk than some chemicals in the industrial research laboratories to which they have been made freely available in the U.S.A. This survey raises several reassuring factors, such, for example, as the computation that the curtailment of the life of anyone exposed to radioactive emission equivalent to 0.3 roentgen per week from the age of 21 until he was 70 might be no more than three months. Low dosage radiation, which even in an industrial laboratory can be rendered innocuous by simple screening with aluminium, cement or lead, according to the type of emission, has been the subject of experiments with animals. The American conclusion expresses the life curtailment factor between 21 and 70 as  $7 \times 10^{-3}$  years per roentgen, or about 2.5 hours per r. Assuming that all such calculations are soundly based and that full use is made of the highly developed screens and detectors, it would seem that the general laboratory use of radioactive substances might be no more hazardous than the universal rain of cosmic rays, to which mankind should by now be pretty well accustomed.

### Chemist's Tragedy

TYPIFYING the host of private tragedies involved by the imposition of a Soviet regime in science is a news item received indirectly from Prague this week. It reveals that Dr. Jaroslav Kulhanek and his wife have committed suicide. Dr. Kulhanek was the first secretary general and co-founder of the Federation of Czechoslovakian Chemical Industries, the organisation founded in the new Czechoslovak Republic in 1918. He occupied that office until he retired in 1930, to be succeeded by his deputy, Dr. George Lewi. Dr. Lewi resigned in 1938 and came to this country. Since 1930, Dr. Kulhanek had practised as a solicitor in Prague and was an acknowledged expert on cartel and syndicate legislation. He took a prominent part in the activities of the Maison de la Chimie in Paris and was decorated with the Legion d'Honneur.

## PROGRESS OF BRITISH STREPTOMYCIN

### *Increasing Quantities Being Exported*

**T**HE very large increase recently made in U.K. production of streptomycin has been reflected in the widening of the basis of distribution, permitting deliveries to be made to doctors and chemists. Until November 1 last year all supplies of the drug had to be sent, under instructions from the health authorities, to the various approved hospitals.

#### **Shortage Overcome**

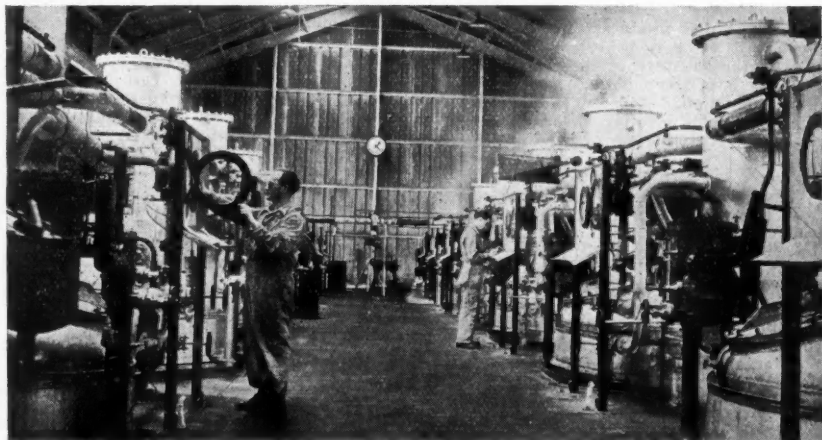
The successful development of streptomycin production has been one of the most outstanding achievements in the pharmaceutical industry in Britain in post-war years, it was claimed last week by Glaxo Laboratories, Ltd. Even in that difficult period when the acute shortage of the drug necessitated BBC appeals for overseas supplies, laboratory investigation and limited production were going on in Britain. The position today is so drastically changed that not only can all home needs be supplied but gradually increasing quantities are being dispatched to hospitals and doctors overseas.

Glaxo Laboratories, Ltd., became interested in this potent antibiotic shortly after its discovery by the American mycologist, Dr. S. A. Waksman, in 1944. By the



*Spray inoculation of a production batch of streptomycin*

end of 1946 preliminary laboratory work was well in hand at the company's antibiotics plant at Barnard Castle, Co. Durham, and in the following year pilot plant production began. By the early part of 1948 the results from the pilot plant were so encouraging that several 5000-gal. fermenters, previously used for penicillin



*Operators minding instruments and logging performance details of fermenters at Ulverston, Cumberland. (Both illustrations by courtesy of Glaxo Laboratories, Ltd.)*

fermentation, were taken over by the chemical engineers for conversion to streptomycin manufacture.

During the initial stages of manufacture a research team worked alongside the production staffs, and this close scientific watch on events led to several important modifications being incorporated in the extraction process. Breakdowns were not infrequent in the early experimental days, and in order to reduce engineering delays to a minimum a team of engineers was standing-by night and day so that defects could be rectified as they occurred. The award in the King's Birthday Honours List last year of the B.E.M. to Mr. Harold Barron, a senior charge-hand in control of the streptomycin engineering force at Barnard Castle, was a recognition of this work.

#### Similar Processes

Many of the manufacturing processes follow the same pattern as of penicillin, and part of the penicillin equipment at both Barnard Castle and Ulverston is economically utilised in streptomycin production. Up to and including the fermentation stage the processes are identical. Streptomycin production begins in the "spore form," where microbiological preparation of streptomycin cultures is carried on alongside penicillin. The inoculum is grown in a one-litre shake flask and passes through a series of tanks of gradually increasing size—initially the 50 and 500 gal. units and finally large 5000 gal. fermenters for large-scale fermentation.

*Streptomyces griseus*, the micro-organism which produces this antibiotic, grows best on a rich protein diet (e.g., meat extract) instead of the relatively inexpensive corn steep liquors used in penicillin production. One of the microbiological problems involved in streptomycin has been the production of a more economical, and at the same time more nutritive, medium.

When the fermentation stages are complete, filtering of the broth removes the mycelium and unwanted solids. The mycelium from streptomycin, unlike that of penicillin, is like thin tissue paper. Streptomycin is extracted by an adsorption process—where it differs radically from penicillin—and is converted to crude hydrochloride. This is in turn converted by a crystallisation process to calcium chloride salt. The calcium chloride is decolourised, Seitz-filtered and freeze-dried in bulk.

To ensure continuous laboratory supervision, routine control of the fermentation and extraction processes at Barnard Castle

and Ulverston is maintained by staffs of chemists working on a continuous three-shift system. Many hundreds of samples of streptomycin are tested biologically, chemically and pharmacologically for potency and sterility, and when these analyses are complete the drug is ready for transfer in bulk to Greenford, where all filling and packing operations take place.

June 23, 1948, will go down in the company's records as an historical occasion, for it was on that day that the first vial of Glaxo streptomycin, to the order of the Ministry of Health, was filled and packed. Since then well over half a million vials of it have been dispatched from the Greenford laboratories.

Constructional work on the Glaxo £1 million streptomycin and penicillin plant at Ulverston began in January, 1947, and the first fermenter unit was inoculated on April 16, 1948, and the second followed it in the subsequent November. Modifications worked at on pilot plant scale at Barnard Castle have been incorporated in the production departments.

Besides the energetic efforts that have been going on at both plants to secure highest production levels of streptomycin, investigational research on dihydrostreptomycin has been proceeding smoothly.

#### Paint Group Segregates Interests

THE formation of four new companies is proposed by Lewis Berger & Sons, Ltd., two of which are to distinguish the United Kingdom and overseas interests of the parent body. The others are principally for home administrative purposes. The companies to be formed to separate the U.K. and overseas activities are Lewis Berger (U.K. Holdings), Ltd., and Lewis Berger (Overseas Holdings), Ltd. The directors have stated that if nationalisation of the paint industry appeared inevitable, they would consider convening a general meeting of stockholders of Lewis Berger & Sons for the purpose of putting that company into liquidation and authorising the distribution to the stockholders in specie of the shares in the three new subsidiaries.

#### Synthetic Drug Danger

Amidone, developed in Germany during the second World War as a substitute for morphine, is stated to be easily produced by "any trained chemist" at low cost and from readily available materials. It is reported by the North American Newspaper Alliance that the U.S. Treasury's Narcotics Division anticipates great difficulty in halting such drug traffic.

# GERMANY'S CHEMICAL RECOVERY

## Western Zone Production 90 per cent of 1936

by JAMES V. BRENNAN\*

THE chemical industry of Western Germany has made considerable progress along the road to recovery. By October, 1949, production of chemicals in the area had reached 90 per cent of the 1936 level.

Economic union of the three western zones had been effected, and many materials and products were being freely exchanged within the integrated territory. Considering the many obstacles and adversities which have hampered the industrial rehabilitation of Germany, this is little short of remarkable.

It should be noted that statistics on post-war German production up to mid-1948 must be viewed with some reservation for a variety of reasons. Wartime disruption of the central government and apprehension over growing inflation, with a consequent resorting to black market and barter transactions, were the principal reasons why manufacturers reported only production sufficient for obtaining allocations of coal, power, and raw materials. They withheld certain unreported portions which were to be used as bartering exchange and to pay their workers.

The year 1936 has been selected as an approximately "normal" year, since war production had not yet begun to any great extent and the country had recovered by that time from the depression.

### Chemical Substitutes

The primary concern of Germany's war planners had been for the development of chemical substitutes for critical industrial materials which might not be available in time of war. High on the list were textile fibres, rubber, petroleum, and fats. This led to research into and later development of substitutes for many essential commodities. Throughout World War II, the German chemical plant as a whole was being enlarged, and, despite the considerable damage suffered during the war, capacity was far greater in 1945 than it had been in 1939.

Current rate of production of most of the

heavy chemicals in Bizonal Germany is in excess of that of 1936.

Production of fertilisers in the Bizone in 1936 and postwar is shown in the following table.

BIZONE PRODUCTION OF FERTILISERS  
('000 Metric Tons)

Period	K <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>
Year—1936 ...	527.8	212.9	336.0
Monthly Average ...	44.0	17.7	28.0
Year—1946 ...	283.9	106.5	81.1
Monthly Average ...	23.7	8.9	7.2
Year—1947 ...	322.0	134.7	102.1
Monthly Average ...	26.8	11.2	8.5
Year—1948 ...	509.7	201.0	200.7
Monthly Average ...	42.5	16.8	16.7
Jan.-June 1949 ...	328.0	139.5	150.5
Monthly Average ...	54.7	23.3	25.1

Source: Bipartite Commerce and Industry Group, Monthly Statistical Bulletin of the Central Commission for Germany (Br. Element), Vol. IV, No. 2, Feb. 1949, and June, 1949.

### Dyestuffs

The once great dye industry, felt the effects of the war-caused economic dislocation to a greater degree than did any other component of the German chemical industry. In 1936, production was in the neighbourhood of 37,000 tons; in 1947, when manufacture was resumed, output had decreased to around 4000 tons, or only 11 per cent of that in 1936. Considerable progress was made during 1948, however, and production for that year totalled 11,700 tons, or slightly more than 31 per cent of 1936. Further gains have been made during 1949, owing primarily to the availability of more nearly adequate coal supplies, so that during June of that year the production of 1400 tons was at the rate of 45 per cent of the 1936 monthly average.

Production of coal-tar chemicals other than dyes had risen to 75 per cent of the 1936 production by the end of 1948. Bizone output of coal-tar products ('000 metric tons) in 1936 (monthly average), with the monthly average of the January-June 1949 period shown in brackets, was: crude coal tar 90.1 (40.6); pitch 42.4 (44.9); oils 25.2 (24.8); phenol, cresols, xyleneol 1.2 (0.7); crude benzol 25.0 (10.8); refined benzol 24.2 (20.0).

By far the largest single producer of chemicals in the French Zone of Germany is the I. G. Farbenindustrie (BASF) complex at Ludwigshafen-Oppau. Production in the Zone (except in the Saar Basin which, economically, is considered a part of France itself) increased 31 per cent in 1948

\* Mr. Brennan is a Foreign Service Officer detailed to the Chemical Branch, Department of Commerce, Washington, D.C. In preparing this report, which appears in the February 10 issue of *Chemical Industries*, from which this summary is taken, he had access to the latest Government information on German chemical production.

over 1947, and in the first half of 1949 approached the 1936 output. Present plans call for an increase by 1952 to 142.7 per cent of the 1936 level. The following table indicates the average monthly production in 1936 and postwar.

FRENCH ZONE PRODUCTION OF PRINCIPAL CHEMICALS (Metric Tons)

Chemical	1936*	1947*	1948*	1949* (6 months)
Nitrogenous fertilisers (N) ...	9,180	3,613	4,009	5,688
Urea (N) ...	n.a.	595	998	263
Sulphuric acid (SO <sub>3</sub> ) ...	16,840	2,542	3,505	5,084
Sodium carbonate ...	2,884	1,943	3,205	4,627
Chlorine ...	—	1,896	1,360	2,380
Calcium carbide ...	6,600	4,872	6,739	6,259
Methanol ...	n.a.	1,655	1,996	1,777
Formaldehyde (30 per cent) ...	n.a.	1,980	2,573	2,836
Hydrochloric acid (100 per cent)** ...	n.a.	439	493	848

\* Only monthly averages available.

\*\* "French Mensuel," April, 1949.

Source: Report on the Economic Evolution of the French Zone of Germany, High Commissioner of the French Republic in Germany.

Note.—n.a.=not available. Ludwigshafen-Opau produced some methanol before the war and it operated a pilot plant where urea was probably produced; however, no production figures are available.

The German chemical industry of to-day is more widely distributed than ever before. In the last phases of the war-preparation programme the chief concern was the placing of new factories at points where they could most readily utilise home resources if the normal sources of supply were to be cut off. Therefore, some of the plants whose capacity was designed to make Germany self-sufficient were placed in or near the forested regions of the south. As the war progressed and Germany became subjected to air attacks, there was a shifting of construction from areas where peacetime developments would normally have taken place.

#### I. G. Farben's Importance

In 1943, there were 4000-odd chemical plants in Greater Germany. The I. G. cartel owned directly, or participated in the ownership or operation of, about 380 plants. However, the importance of this firm to the chemical industry may be adjudged by the fact that it accounted for approximately 50 to 55 per cent of all chemicals and allied products in Germany.

Production of chemicals remains one of the important industries of Western Germany.

Although the three Western Zones are now a single economic entity, the lack of comparable statistics for the French Zone before mid-1949—particularly on foreign

trade—has made it advisable to treat the Bizone and the French Zone separately for industrial purposes.

About 53 per cent of the chemical production of all Germany in 1936 came from the Bizone. The following table shows production of the principal industrial chemicals manufactured in the Bizone in 1936, and postwar.

BIZONE PRODUCTION OF PRINCIPAL INDUSTRIAL CHEMICALS ('000 Metric Tons)

Period	Sulphuric Acid	Caustic Soda	Chlorine	Soda Ash	Calcium Carbide
Year—1936 ...	821.0	94.8	61.2	375.0	477.6
Monthly Av. ...	68.4	7.9	5.1	31.2	39.8
Year—1946 ...	279.2	82.1	61.0	205.8	234.7
Monthly Av. ...	23.3	6.8	5.1	17.1	19.6
Year—1947 ...	421.8	89.6	65.0	253.8	215.5
Monthly Av. ...	35.2	7.5	5.4	21.1	18.0
Year—1948 ...	620.5	155.4	100.5	377.2	333.6
Monthly Av. ...	51.7	12.9	8.4	31.4	27.8
Jan.-June 1949	435.3	110.6	68.3	261.7	212.3
Monthly Av. ...	72.5	18.4	11.4	43.6	35.4

Source: Bipartite Commerce and Industry Group, Monthly Statistical Bulletin of the Central Commission for Germany (Br. Element), Vol. IV, No. 2, Feb., 1949, and June, 1949.

#### Chemistry and Stone Building

THE part which chemistry can play to help revive one of the country's oldest and most treasured industries, building in stone, is deserving of greater recognition. High costs and the lack of scientific research for reducing them still retard the work of making construction in stone as common as it deserves to be.

These facts are revealed by W. J. Arkell, a geologist of international repute, in an article in *Endeavour* (9, No. 33, pp. 40-44). He claims that a most obvious and essential responsibility of science is to provide means of determining the durability of building stones, and he has acknowledged the good work already undertaken at Watford by the Building Research Station.

For Portland stone and some similar oolites the crystallisation test has been found most reliable. This requires specimens of standard size to be soaked in a 14 per cent solution of sodium sulphate and dried in an oven under strict control. The force of crystallisation disrupts the weaker stones but not the stronger. The Building Research Station has also found that stones of proved durability have the lowest microporosity, states the author. Vigorous research is clearly needed if costs of stone building are to be reduced. At some quarries compressed air has revolutionised quarry-dressing of the freestone; some mechanical means of rough-dressing the walling-stone might also be devised.

## DECLINE IN OIL PRODUCTION

## Survey of World Supplies in 1949

THE continuation of the decline in world crude oil production noted in the first half of last year (THE CHEMICAL AGE, 61, 455) has been indicated by the fact that total output in 1949 was about 468 million metric tons, which was three million tons (or nearly one per cent) less than the record attained in 1948.

A very important factor was the decline of the U.S.A.'s share in total production by nearly 24 million tons, in contrast with an increase of 13 million tons in the Middle East. There were comparatively few changes in the Latin America countries, but Canada and a number of countries in the Eastern Hemisphere produced more than in 1948.

Despite some considerable variations in individual countries total output in the second half of 1949 remained at almost the same level as in the first six months, according to the February issue of the *Petroleum Press Service*.

The rise in Canada's production from 1.691 million tons in 1948 to 2.930 million tons last year was largely due to extensive and promising oil discoveries in Alberta. It is expected that the Dominion's output, which was running at an annual rate of over three million tons in 1949, will be doubled during the current year.

In Venezuela, output of heavy crude was substantially cut in the early half of 1949 because of lower demand, but most of the ground was regained later in the year and, in December, output reached a

new record of 1,489,000 barrels per day. Colombia's production had been particularly low in 1948 owing to prolonged labour disputes, but output was boosted last year by bringing into production two new small fields. In Trinidad, a slight increase was achieved in spite of difficult geological conditions.

Production in Mexico increased substantially towards the end of the year to keep pace with rising home demand and total output rose from 8.376 million in 1948 to 8.700 million tons last year.

Production in Kuwait showed the most striking increase in the Middle East area, with a rise of six million tons, nearly doubling the output in 1948.

Iraq suffered from the closure throughout the year of the pipe-line from Kirkuk to Haifa. The recent opening of a second pipe-line from Kirkuk to Tripoli (Lebanon) has, however, raised the effective transport capacity to the Mediterranean to about six million tons annually, without the Haifa outlet.

Egyptian production was also slightly greater and commercial production was begun on a small scale in Eastern Turkey, the first shipment being made on December 31 from the Sheikdom of Qatar.

In the Far East, failure of reconstruction efforts in Burma was offset by further progress in the restoration of output in Indonesia. In Netherlands New Guinea, which entered the list of oil producing countries at the end of 1948, production from the Klamono field has been estab-

Estimated World Production of Crude Oil

	1948 (000 metric tons)	1949			
U.S.A....	277,190	253,200	Brit. Borneo <sup>4</sup>	2,870	3,540
Canada .....	1,691	2,930	Netherl. New Guinea	—	250
			India .....	249	250
Venezuela .....	70,116	68,381	Others <sup>2</sup>	300	350
Colombia .....	3,372	4,163	Germany .....	635	842
Trinidad .....	2,885	3,050	Netherlands .....	496	620
Mexico .....	8,376	8,700	Others <sup>4</sup>	120	130
Argentina .....	3,330	3,200	U.S.S.R. ....	29,100	33,200
Peru .....	1,872	1,970	Rumania .....	4,500	4,200
Ecuador .....	858	340	Austria .....	910	900
Others <sup>1</sup> .....	80	80	Hungary .....	470	510
Persia .....	25,269	27,080	Albania .....	245	330
Saudi Arabia .....	19,260	23,471	Others <sup>7</sup> .....	210	240
Kuwait .....	6,400	12,371	World Total .....	470,971	467,663
Iraq .....	3,153	3,845			
Egypt .....	1,914	2,220			
Bahrain .....	1,500	1,600			
Others <sup>3</sup> .....	—	50			
Indonesia <sup>5</sup> .....	4,120	5,650			

<sup>1</sup> Bolivia, Brazil, Cuba; <sup>2</sup> Qatar and Turkey; <sup>3</sup> Excluding Netherlands New Guinea; <sup>4</sup> Sarawak and Brunei; <sup>5</sup> Japan, Pakistan, China and Burma; <sup>6</sup> U.K., France and French North Africa, Italy; <sup>7</sup> Poland, Yugoslavia, and Czechoslovakia.—Source: Petroleum Press Service, xvii, 2, 1950, 31-32.

lished at about 250,000 tons annually. British Borneo raised its output still further to over 3½ million tons a year.

Important discoveries, made last year in both Holland and Germany, have resulted in a substantial increase in output. Hopeful indications of oil resources have been discovered in Northern Italy, but in France and in French North Africa, where the most extensive search is being made, no positive results have as yet been obtained.

Because of the scarcity of information about the countries of Eastern Europe, crude oil production estimates invariably contain a large element of uncertainty. However, output in the Soviet Union is estimated to have increased last year by 14 per cent to 33.2 million tons.

Output in Rumania, which increased by 18 per cent in 1948, under last year's production programme, should have shown a further rise, but is estimated to have been below the 1948 total. Eastern Austria was last year the scene of at least one important discovery, but many of the older fields are reported to be showing signs of exhaustion. Some increase may have occurred in Hungary, but production remained far below the goal of the three-year plan. Reports from Albania record a substantial advance in yields, but production in the remaining People's Republics, in spite of some increase reported from Poland, is merely of local significance.

### Five-Fold Increase of Rubber Latex Industry

SOME of the means by which latex foam production has been expanded in less than a quarter of a century into an industry with an annual output of 40,000 tons, valued at £16 million, were demonstrated in London this week by an exhibition of the varied applications of Dunlopillo.

The original cake-mixing machine in which latex foam was first produced at Fort Dunlop was demonstrated by Mr. F. C. Jennings, who was introduced as one of the "back-room boys."

Some of the problems which had to be overcome were described by Mr. Jennings, who recalled that the original latex received from Malaya consisted of one-third rubber to two-thirds water, and also lacked uniformity. On the recommendation of the company's chemists, centrifuges were installed on the plantation, so that a more concentrated latex containing 60 per cent rubber was obtained.

### RUBBER IN 1949

#### Decline of the Synthetic Product

THE reduction by almost 20 per cent of the U.S. output of synthetic rubber was mainly responsible for the world's smaller total of 440,332 tons in 1949, compared with 532,186 tons produced in the previous year.

The world production of natural rubber in 1949 is estimated to have been 1,482,500 long tons, 37,500 tons less than the 1948 output. World consumption of the natural product increased slightly (by 7500 tons) to an estimated 1,427,500 tons.

The Rubber Study Group, releasing these figures, has prepared a survey of the world's rubber situation at the end of 1949, showing stocks held by the principal producer and consumer nations of both natural and synthetic rubber.

Although British and U.S. consumption of natural rubber dropped by about 5 per cent and 8 per cent respectively, consumption in Western Germany increased almost 50 per cent—from 32,500 to 75,000 tons, and that of other European countries, excluding the U.S.S.R., from 223,971 to 247,138 tons. Russian consumption is estimated to have risen by 5000 tons to 105,000 tons in 1949.

World stocks at the end of 1949, excluding Government stocks not available to industry, are calculated by the Rubber Study Group at 757,500 tons of natural rubber and 110,000 tons of synthetic.

Preservation of latex had presented another difficulty. The original liquid would last only about six months, but after treatment with ammonia it could be safely kept for at least five or six years.

Soap was essential to produce the foaming, and the mixture could be set in 15 minutes by the introduction of a gelling agent.

A series of photographs showed stages in the production of Dunlopillo from the tapping of the rubber trees in Malaya to the production of the finished article.

Mr. Leonard Harral, describing the wide varieties of uses of the porous sponge rubber, said that production was five times greater than before the war. By improved methods, using the same space as in 1948, output last year had been increased by 88.5 per cent.

The exhibition is at present open to the trade, but will be on view to the public from February 27 to March 3.

## TRADE WITH SCANDINAVIA

### I.C.I. Foresees Better Prospects

THE value of Norway, Sweden and Denmark, as markets for British chemical products is increasingly evident. With the freeing this year of some important materials from import duty, the Scandinavian countries are showing their need to obtain from Britain and the U.S.A. industrial goods which, before 1939, were imported from Germany.

Some indication of the importance of these countries to I.C.I., Ltd., is given in the current issue of *I.C.I. Magazine*, which states that the organisation is represented in Scandinavia by a large number of agents—about 15 in Denmark, 20 in Sweden and 12 in Norway—as well as by a liaison office in Gothenburg, Sweden.

The whole of Scandinavia shows an unmistakable desire for vigorous trade relations with this country, and its potential turnover with I.C.I. is large, states the company's European department. Unfortunately, numerous artificial barriers still result in a great discrepancy between what would be commercially possible and what is in fact possible in the present unnatural conditions of European trade.

The relaxation of trading restrictions, helped largely by the OEEC, is said to have greatly improved I.C.I.'s business, notably in exports of dyes to Sweden.

Practically all I.C.I. divisions do business with Scandinavia, and some is on a large scale; Metals Division, for instance, already has an annual turnover of more than £500,000. In the absence of restrictions, Dyestuffs Division alone would probably do business to the value of over £1 million; the turnover in heavy chemicals might well be about the same; and Nobel Division could conceivably exceed £200,000.

The devaluation of Scandinavian currencies in line with sterling has also improved trading prospects, but it is realised that the German share in the Scandinavian market is likely to increase.

### Norway's Export Totals

Exports from Norway last year almost exactly corresponded with the budget estimate of £105 million. Chemical fertiliser exports rose by £2 million to £7 million; fats and cod liver oil increased from £15 to £18 million, but timber products (pulp, paper, etc.) declined from £31 to £29 million. Total imports for 1949 exceeded the budget estimate by £10 million.

## PEST CONTROL PRODUCTS

### Need For Simplified Names

THE great advance in the development of chemicals for pest control, particularly in the past ten years, has made it necessary that new compounds, as they made their appearance in the medical and other industrial fields, should be given names.

Chemical nomenclature has in many instances been too complicated for common use, and shortened forms and trade names have therefore been devised. As there may be several of these applied to one chemical compound, confusion has arisen in commercial descriptions of products and in the scientific literature.

This problem was discussed at the Commonwealth Entomological Conference in 1948 and a resolution was passed urging the appointment of a committee to agree common names for established compounds.

The Commonwealth Agriculture Bureaux accordingly referred the recommendation to the British Standards Institution, which has now appointed a technical committee "to prepare standards for the nomenclature of insecticidal and fungicidal chemicals and other pest control products." It is not intended that the simpler names should conflict with proprietary names; they should indicate to users the active ingredients of pest control products.

The committee has as its chairman Mr. H. J. Jones, A.R.I.C., and includes representatives of Commonwealth countries, Government departments, scientific societies and manufacturers' organisations.

It is stated to be working in the closest collaboration with the standards organisations in Commonwealth countries, and with the Inter-Departmental Committee on Pest Control in the U.S.A. Standards organisations in other countries have been informed of the committee's objects and it is hoped that it may eventually be possible to arrive at international agreement on nomenclature.

### Scandinavian Exchanges

A protocol broadening the trade agreement between Norway and Sweden for the exchange of goods during 1950 will permit a considerable increase in the level of trade in chemicals, metals, etc. Norway will supply greater quantities of nitrate of lime and aluminium, sulphur, pyrites, ferro-alloys, zinc and timber. Sweden's exports will include special steels, more machinery, iron and zinc ores, chemical products, timber and chemical wood pulp.

# REDUCED STOCKS OF NON-FERROUS METALS

## Fluctuations in December

THE details of production, consumption and stocks in December, issued by the British Bureau of Non-Ferrous Metal Statistics, reveal substantial fluctuations compared with November (THE CHEMICAL AGE, 62, 44) and with December 1948 (60, 258). Prominent among these is primary refined copper production of which in December, at 7932 tons, showed a drop of 1416 tons since November and was 2661 tons less than in December 1948. Consumption of primary refined copper in December (24,325 tons) represented a drop of 4334 tons from the November figure of 28,059 tons. The total consumption figure of this item in December 1948 was also larger (28,326 tons).

### UNWROUGHT COPPER

	Long Tons	
	Bilister	Refined
	Copper	Copper
OPENING STOCKS		
Govt. and consumers'	50,570	86,036
Imports ...	4,400	13,287
PRODUCTION :		
Primary ...	—	7,932
Secondary ...	1,997*	6,219
CONSUMPTION :		
Primary ...	8,001	24,325
Secondary ...	—	14,517
Exports ...	1,577†	10
CLOSING STOCKS :		
Govt. and consumers'	46,796	82,878

\* Rough Copper.

† Rough Copper to Germany for refining on toll.

### GROSS OUTPUT OF MAIN COPPER, ALLOY AND PRODUCTS

Unalloyed copper products ...	22,814 long tons
Alloyed copper products ...	22,670 "
Copper sulphate ...	3,801 "

### UNWROUGHT ZINC

	Long Tons	
	Zinc in Concentrates (estimated gross Zinc content)	Slab Zinc (all grades)
OPENING STOCKS :		
Govt. and consumers'	37,377	64,169
Imports ...	7,241	10,016
PRODUCTION :		
Virgin and remelted	—	6,709
CONSUMPTION :		
Virgin (incl. debase)	7,592	19,025
Remelted and scrap	—	6,712*
Exports and Re-export	—	3
CLOSING STOCKS :		
Govt. and consumers'	37,026	61,570

\* Includes small quantity of zinc in concentrates consumed directly for chemicals, etc.

### LEAD

	Long Tons		Lead Content of second-ary Scrap and Residues
	Lead in Concentrates	Virgin English Refined	
OPENING STOCKS :			
Govt. and consumers'	—	53,001	2,149
Other stocks ...	53	—	—

IMPORTS ...	—	9,951	—	80
PRODUCTION ...	184	—	2,188	—
CONSUMPTION ...	157	14,003	1,813	10,921
Exports ...	—	13	—	—
CLOSING STOCKS :				
Govt. and consumers'	—	48,875	2,524	—
Other stocks ...	80	—	—	—

### TIN METAL

	Long Tons	
	Govt. and Consumers' Stocks (at end of period)	
IMPORTS ...	—	15,469
PRODUCTION ...	—	—
CONSUMPTION ...	—	1,606
EXPORTS AND RE-EXPORTS ...	—	582

### ANTIMONY

	Long Tons	
TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS ...	—	306
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP ...	—	265

### CADMIUM

	Long Tons	
TOTAL CONSUMPTION OF CADMIUM ...	—	32.05

## N.-F. METAL RESEARCH

### New Laboratories Opened

THE new laboratories of the British Non-Ferrous Metals Research Association in Euston Street, London, were opened this week by Sir Ben Lockspeiser, secretary of the DSIR.

The original laboratories were destroyed by bombing in 1940, and the new building provides research facilities for immediate needs, although it is foreseen that increasing demands from industry may soon render them inadequate.

Research in the scientific background of the process used in the extraction and manufacture of non-ferrous metals and alloys, and their selection for particular uses, is the first concern of the association.

Corrosion resistance is one of the topics of principal importance from the user's point of view, while information is frequently sought on mechanical properties and development of special alloys.

Problems suitable for the facilities and staff of the association and of importance to the industries concerned are dealt with by a research board which is advised by four industrial scientists representing sections of the non-ferrous metals industries.

Aluminium and magnesium are represented by Dr. C. J. Smithells; copper and nickel by Dr. W. E. Alkins; lead and tin by Colonel Sir Paul Gueterbock; and zinc and galvanising by Mr. Stanley Robson.

## Basic Chemicals in November and December

### Improvement in Levels of Production and Stocks

THE record of production of some basic chemical materials and metals in November last was in some instances slightly lower than the previous month, but there was a general increase over the output for November, 1948. Consumption levels remained fairly steady, while stocks showed an improvement over the same period of last year. Noteworthy exceptions were industrial alcohol and ammonia, reserves of which were greatly reduced.

Estimated numbers of employed in the chemical and allied trades in November

(in thousands) again showed a rise to a total of 445.4, an increase of 1.3 over the October total. Distribution of workers was as follows: coke ovens, chemicals and dyes, explosives, etc., 256.1 (187.2 men, 68.9 women); paints and varnishes 38.3 (27.0 men, 11.3 women); oils, greases, glue, etc., 67.0 (58.3 men, 18.7 women); pharmaceutical, toilet preparations, etc., 84.0 (42.2 men, 41.8 women).

These figures and the table given below are abstracted from the *Monthly Digest of Statistics*, No. 49 (HMSO, 2s. 6d.).

	November, 1949		Stocks	November, 1948		Stocks
	Production	Consumption		Production	Consumption	
Thousand Tons						
Sulphuric acid	151.2*	148.0	—	134.4*	131.0	—
Sulphur	—	27.9*	87.1*	—	24.4*	66.1*
Pyrites	—	20.4*	84.0*	—	20.6*	68.0*
Spent oxide	—	17.0*	179.3*	—	17.2*	169.2*
Molasses (cane and beet)	58.1	22.3†	260.7	48.9	21.0†	248.8
Industrial alcohol (mil. bulk gal.)	1.6	2.46	2.4	1.7	2.21	8.45
Ammonia	—	6.82*	4.8*	—	6.58*	6.29*
Superphosphate	19.3	17.2	—	17.6	16.5	—
Compound fertiliser	161.5	111.9	—	155.9	111.6	—
Liming materials	—	710.0	—	—	558.9	—
Nitrogen content of nitrogenous fertilisers	20.41	19.36	—	20.22	19.61	—
Phosphate rock	—	93.3	203.4	—	90.3	178.5
Virgin aluminium	2.33	14.6	—	2.46	16.4	—
Virgin copper	—	30.9	136.6	—	31.3	115.7
Virgin zinc	—	19.6	64.2	—	18.7	49.9
Refined lead	—	17.9	55.2	—	19.0	21.4
Tin	—	2.03	22.3	—	2.1	17.1
Zinc concentrates	—	13.4	77.0	—	12.0	24.0
Magnesium	0.52	0.41	—	0.45	0.53	—
Pig iron	186.0*	141.0	526.0*	176.0*‡	141.0	279.0*
Steel ingots and castings (including alloys)	291.0*	—	1,245.0	282.0*‡	—	1,002.0
Rubber: Reclaimed	0.51	0.59	2.33	0.47	0.49	4.15
Natural (including latex)	—	4.02‡	41.9	—	4.68‡	58.7
Synthetic	—	0.05	1.22	—	0.05	2.05

\* December.

† Distilling only.

‡ Average of five weeks.

° October.

### Belgian Chemical Industry

THE Belgian Minister of Economy has been studying the effects of Marshall Aid on the country's chemistry industry. He has estimated that if the aid continues until 1952, the number of persons employed in the industry will be about 32,000, against 33,000 at the end of 1947 and 29,000 at the end of 1948. Without Marshall Aid, the number is expected to remain constant at 29,000 until 1952, but is unlikely to vary greatly because the industry is already highly mechanised. Fluctuations are likely only in the production of nitrogen manures, caustic soda, calcium carbide, copper sulphate, sodium sulphate, artificial resins and aniline dyes.

### China's Tung Oil Exports

CHINA'S probable production of tung oil in 1949-50 is estimated at 100,000 metric tons, a decline from the 115,000 tons produced in 1948-49, which was the highest quantity since pre-war years. The indicated exportable surplus is 65,000 to 70,000 tons which, together with the unmarketed portion of last season's output, could enable exports in 1949-50 to equal the peak shipments of 85,000 tons in 1947-48, if marketing conditions were normal. The tendency towards increasing exports to the U.S.S.R. may, it is thought, reduce supplies of tung oil to other markets. Normally, the U.S.A. is the principal market for Chinese tung oil, taking about 75 per cent of exports.

## Chemical Processing of Wood Waste

### Numerous Applications in Building Industry

THE utilisation of wood waste for making wallboard and other materials of moulded construction, although a very young science, has made sufficient practical progress to be of great interest to the building industry.

At a recent conference at Harvard University, in the U.S.A., of the Northeastern Wood Utilisation Council (New Haven, Conn.) the potential uses of wood waste were discussed and a wide variety of materials described. Some of the proceedings are reported in *Svensk Pappers Tidning* (53, 39-40), of which a summary is reproduced here.

#### Potential Increases

Mr. E. S. Sowinski, who reported on his field survey of New England for the council, said that ample supplies of wood waste were available from the wood-using industries, more than 350,000 tons a year. It was pointed out by Mr. J. A. Nicholson, however, that public acceptance in the U.S.A. of new products based on wood waste could be encouraged by the better education of home owners, builders and architects in the merits and the limitations of such products.

In Sweden, consumption of wood waste and other fibre composition boards was stated to be seven times that of the U.S.A.

The manufacture of resin bonded boards from wood waste was the subject of a paper by Dr. O. Wyss, Interwood, Ltd., of Zürich, Switzerland. He showed the relation of the properties of fibre boards to their densities.

Soft boards with densities about 0.3, and hardboard, with densities about 1.0, were well known, but boards half hard (densities 0.5-0.6) and three-quarters hard (densities 0.7-0.8) were becoming important in Europe because they resembled wood more closely in working properties. Such boards were made by wet processes using the Asplund defibrator or other disintegrating devices and were urea or phenolic resin.

The dry processing of sawdust into a hardboard without resins was described by Dr. D. F. Othmer, head of the department of chemical engineering at the Polytechnic Institute of Brooklyn. A few per cent of inexpensive, readily available chemicals were dry mixed with sawdust which was then hot pressed. The board was strong, had a low water absorption and showed only a few per cent of swelling. It could

be laminated with metal foils or plastics in the manufacturing process, in which fire or pest resistance characteristics could also be incorporated. The chemicals used during moulding apparently reacted with the wood substances, but the exact chemical reaction had not been clearly established.

The Xilon process, a semi-chemical process of pulping wood and other fibre wastes, developed in Italy by Azienda Brevetti Industrial and now available in the United States, was described by Paulo Marpillero. A two per cent solution of sulphuric acid in open tanks is used. The acid hydrolyses the pentosans in the wood and the softened wood is then neutralised and defibred mechanically, without removing the lignin. Two plants have been in operation in Italy for more than five years and plans for a plant in Brazil and in other countries are being formulated.

An example of wood waste utilisation for moulded construction materials was demonstrated by Durisol, Inc., New York 17. Durisol consists of chemically treated wood shavings bonded with portland cement and moulded under pressure. The product was said to be fire-resistant and to have good heat and sound insulating properties.

#### Resin-Bonded Board

The use and effect of resins in wood waste boards was reviewed by Mr. W. T. Sears, of the Monsanto Chemical Company, and some features of equipment available for wallboard manufacture were described by Mr. H. D. Thweatt, of the Lake Erie Engineering Company, Buffalo, N.Y.

A paper by Mr. Gösta Genberg, of Svenska Cellulosa AB, dealt with wallboards made by that company and another, by Mr. W. J. Fishbein, of the British Artificial Resins Co., Ltd., gave details of a machine for the continuous manufacture of resin bonded wallboard.

The board products of the Wonderwood Corporation, Corona del Mar, California, were also manufactured by six European countries. In the process wood waste was bonded with resins at a low heat and pressure into panels which could then be faced with veneers or plastics. They were claimed to be resistant to water, fungus, dry rot, termites and fire.

The full text of all the papers submitted at the conference and a transcript of the discussion is published in the council's bulletin series, January 1950.

# Drugs and Fine Chemicals in 1949—III

## Striking Effects of Combined Injection Therapy

by G. COLEMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

**T**HE exceptionally rapid action of desoxycorticosterone acetate and ascorbic acid has been well established, as for example by Lewin and Wassen's observations of the combined injection in rheumatoid arthritis subjects. (*Lancet*, Nov. 26, 1949, 993.)

They found that a combined injection of these drugs gave most marked relief from pain and restoration of free movement less than an hour after injection in some cases and the effects might last from 2 hours to 24 hours or more before they wore off. The injection of ascorbic acid (vitamin C) must follow the injection of desoxycorticosterone within two to five minutes to be certain of full effect.

Desoxycorticosterone was introduced into the 1948 edition of the British Pharmacopœia and is a 21-hydroxy derivative of progesterone. It was first isolated from the adrenal cortex in small amounts by Reichstein and other in 1938 (*Helv. Chim. Acta*, 1938, 21, 1197). By contrast with cortisone, desoxycorticosterone seems to be concerned mainly with the metabolism of salt and the maintenance of the salt balance within the body's tissues. Cortisone, in common with other hormones of the adrenal cortex, with a ketone or hydroxy group at C-11, has only a slight effect on salt retention.

### Ineffective Alone

Desoxycorticosterone and other steroids which resemble it in structure fall into the Groups 1 and 2 mentioned in an earlier article, and seem to have no effect on the course of rheumatoid arthritis. That property appears to be restricted to cortisone and the hormones in Group 3 which control carbohydrate metabolism. This effect of the combined administration of desoxycorticosterone and ascorbic acid is, therefore, a very surprising one.

The findings of Lewin and Wassen have been supported and confirmed by Fox and Douthwaite.

On the other hand, Kellegren (*Lancet*, Dec. 10, 1949, 1108), working at the Rheumatism Research Centre at the University of Manchester, has repeated the work of Lewin and Wassen, using a series of objective tests devised by him and his colleagues for measuring the potency of antirheum-

atic remedies. By these criteria they were unable to demonstrate any beneficial results from the combined therapy. They suggest that one reason for the conflicting reports may be confusion in the differential diagnosis of rheumatic fever and rheumatoid arthritis. Similarly, Hartfall and Harris (*Lancet*, Dec. 24, 1949, 1202) and Lloyd, Hart and Starer (*Lancet*, Dec. 24, 1949, 1204) report unfavourably on the treatment by combined injection.

Fox admits that the whole problem of rheumatic disease is complex and that the endocrine element—i.e., the effects due to the interplay of hormones in glandular secretions—may be only one factor which, in rheumatoid arthritis is, however, undoubtedly a determining one.

### Confirmatory Results

Vay and Loxton (*Lancet*, Dec. 17, 1949, 1134) also confirm the results of Lewin and Wassen, having treated 23 cases of polyarthritis, mostly of the rheumatoid arthritis types, with the combined injection therapy. Six of these cases showed dramatic improvement for several hours' duration; 15 showed a little very temporary improvement and two failed to respond.

This combined injection therapy will, undoubtedly, be exhaustively explored in coming months if only because—unlike cortisone and adrenocorticotrophic hormone—desoxycorticosterone acetate is made readily accessible by synthesis and ascorbic acid is, of course, freely and cheaply available. Fox has estimated that the combined injection costs about 7s. 6d. per injection; whereas the cortisone or ACTH treatment is prohibitively costly.

Selye, of the University of Montreal, has studied over a period of years the participation of the adrenal cortex in the pathogenesis of arthritis and had concluded over five years ago that the adrenal cortex might play an important rôle in this connection (*J. Amer. Med. Ass.*, 1944, 124, 201). At that time it had been observed that both lyophilised anterior pituitary gland and desoxycorticosterone actually produced arthritis in experimental animals, but not with that degree of regularity necessary for systematic investigation.

It is again worthy of note that in this

respect, that is in the stimulation of arthritis, desoxycorticosterone has an opposite effect to cortisone which makes the combined desoxycorticosterone/ascorbic acid therapy difficult of explanation.

Selye has now demonstrated that acute arthritis or peri-arthritis induced in experimental animals by the local injection of formaldehyde is aggravated by pretreatment of the animal with desoxycorticosterone or crude anterior pituitary preparations. But "formalin-arthritis" may be almost completely inhibited by pretreatment with either cortisone or adrenocorticotrophic hormone. This indicates a possible antagonism between each of these pairs of substances.

### Current Theory

Selye considers it "rather probable" that the inhibition of "formalin-arthritis" by ACTH, cortisone or "alarm reaction" may be due to the effect of a cortisone-like "glucocorticoid" (in contradistinction with "mineralocorticoids" which have an action on salt metabolism similar to that of desoxycorticosterone) on the directly injured tissues.

The mechanism of the response is unknown as yet; but it may involve the known antihyaluronidase effect of glucocorticoids or their known antihistaminic activity ("hyaluronidase" is the "spreading factor" which is able to modify the permeability of the tissues of the body). In this connection it has long been assumed that histamine-like compounds released from the tissues at the seat of an injury play a major rôle in the processes of inflammation. Selye suggests that it would be of great interest to examine the value of antihistaminics in some of the clinical conditions met with in rheumatism.

It has already been pointed out that one of the problems in synthesising cortisone is the introduction of oxygen at the C-11 position. The methods to achieve this have been comprehensively reviewed by Fieser and Fieser ("Natural Products Related to Phenanthrene," 3rd Edition, p. 452, *et. seq.*; Reinhold Publishing Co., N.Y., 1949).

Hechter *et al.*, however, now describe a novel approach to this difficult synthetic problem using a biochemical technique (*J. Amer. Chem. Soc.*, 1949, 71, 3261). 11-desoxycorticosterone was perfused through isolated adrenal glands and the perfusate was found to possess glycogenic activity which could not be explained except on the basis that the isolated adrenal gland had introduced an oxygen function at C-11.

This clue was followed and eventually corticosterone was isolated as the principal transformation product. 11-desoxycorticosterone - 21 - acetate also yielded corticosterone, the ester group being hydrolysed during the perfusion. The authors are extending these biochemical studies to a series of steroids and their results will be awaited with interest.

Koechlin *et al.* (*J. Amer. Chem. Soc.*, 1949, 71, 3263) describe the synthesis of "Compound S" which is the 11-desoxy-analogue of Kendall's Compound E (Cortisone) from 11: 20-diketone-steroids by the introduction of a 17:  $\alpha$ -hydroxy group into 3:  $\alpha$ -alkyloxy-17:  $\alpha$ -hydroxypregnan-20-one.

It will be seen that a great intensification of work in the field of the cortical steroids will develop in ensuing years. It is not beyond the bounds of reasonable probability that the use of cortisone in the temporary relief of the symptoms of rheumatoid arthritis may become a side-issue compared with the enormous new fields in chemistry, biochemistry and physiology which the discoveries of Kendall and Hench have laid open in such a fascinating way.

### Use of Chemical Methods

In another field of steroid chemistry Watteville, Salinger and Borth (*Brit. Med. J.*, Aug. 13, 1949, 352) have stressed the increasing importance attached to the determination of the concentration of sex hormones in the body fluids as an aid in diagnosis. They point out that there are, in many cases, alternative chemical and biological methods of assay.

Chemical methods are cheaper and simpler to carry out; but in any chemical method which might be adopted it is necessary to establish that certain chemical structures with specific properties are really typical of a given hormone or of its metabolites, and that no other compound in the tissue extract shows these particular properties or reactions.

This is a very limiting consideration at present. For this reason, for example, gonadotropins, which are protein derivatives of unknown constitution, can only be assayed exclusively by the more costly and cumbersome biological methods. In the case of the naturally occurring oestrogens (oestradiol, oestrone, and oestriol) colorimetric methods have been developed but they are insufficiently sensitive, except when the steroid is in high concentration in the body fluids, as in pregnancy.

A fluorimetric method has, however, been developed by Jailes (*Endocrinology*, 1947, 41, 198; *J. Clin. Endocrinol.*, 1948, 8,

564), which has proved sufficiently satisfactory to have been used extensively in veterinary medicine.

It was made clear in an earlier article that the mechanism by which cortisone works in rheumatoid arthritis is, at present, unknown; but there are already indications that its action in rheumatoid arthritis may be a manifestation of a more general mechanism by which the body's reaction to an exciting agent may be modified; or, in other words, a mechanism by which hypersensitive reactions are "blocked."

An important piece of evidence contributing to the support of such a hypothesis has been provided by Bordley *et al.* (*Bull. Johns Hopkins Hosp.*, 1949, 85, 396; *Lancet*, Dec. 24, 1949, 1185) who appear to have obtained marked results in the treatment of allergic conditions, using the adrenocorticotrophic hormone.

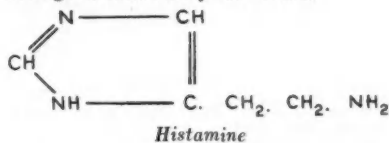
### Continued Application

By such treatment dramatically rapid recovery has been obtained in such cases as exfoliative dermatitis due to iodine, penicillin sensitivity and chronic asthma. As in the treatment of rheumatoid arthritis with cortisone or ACTH, there was a tendency for relapse some time after completion of the course of treatment.

It would appear, that, for some time to come at least, the use of antihistaminic drugs in the treatment of various allergic diseases is not likely to be displaced. In fact the past year has shown some rapid advances in this field—mainly by way of fresh discoveries in their field of useful-

ness rather than any new developments in the chemistry of these drugs.

The mechanism of allergic reactions is far from being fully understood. It seems clear, even though it has not been proved, that the release of free histamine in affected tissues is to some degree responsible for the variety of allergic symptoms and the manifestation of anaphylactic shock. Histamine (4- $\beta$ -iminazolyethylamine) is normally bound up in some complex in the tissues; it appears to be released in an uncombined form when damage is suffered by the tissue.



Free histamine causes contraction of plain muscle and dilation of the capillary blood vessels with other consequences which lead to the various manifestations of allergy. Much thought has been given to the means by which histamine, thus released in a free form, might be rendered harmless to the tissues. One line of attack has been actually to inject histamine in gradually increasing doses in an attempt to desensitize. This has not proved a very fruitful approach. Another line of approach has been to inject a soluble histamineazoprotein in the hope of creating, through an antibody promoting mechanism, a tolerance to histamine. (To be continued)

## Fertiliser Experiments with Urea-Formaldehyde

**A**SOURCE of nitrogen for tobacco fertilisation is said to have been obtained by the development of a new urea-formaldehyde compound.

Mr. T. R. Swanback, an agricultural chemist of the Connecticut Agricultural Experiment Station, has been conducting experiments with the material, obtained from the U.S. Department of Agriculture, Beltsville, Md., for the past two years, states *The American Fertiliser* (112, No. 1, 18).

He has found that the urea-formaldehyde ("urea form") in combination with cottonseed meal results in 16 to 23 per cent increase in grading and yield over cottonseed meal alone. The combination material has an advantage over urea

alone because its nitrifying action is slower. Urea releases too much ammonia too soon and this affects tobacco adversely, producing too much dark colour in the leaf. Urea-form, producing ammonia more slowly, is said not to have this effect. In comparison with cottonseed meal, four per cent less dark leaf colour was produced with the urea-form-cottonseed meal treatment.

Mr. Swanback found that the treatment giving best crop value (yield plus grading of tobacco) was a mixture of 25 per cent urea-form and 75 per cent cottonseed meal. Urea-form has so far been available for experimental purposes only, but it may be on the market in 1950 or 1951. It will sell at a lower price than nitrogen in cottonseed meal.

# THE COMBINED MANUFACTURE OF CEMENT AND CHEMICAL PRODUCTS

## Important Commercial Processes Involved

by H. LAFUMA\*

**T**HE principle of manufacturing simultaneously cement and chemical products required in large yields, such as alumina, phosphorus or its derivatives, or metallurgical products, is already well established and its development has led to the inception of some important commercial processes.

### Technical Difficulties

With the current stage of commercial development, these simultaneous processes are somewhat limited at present by certain technical difficulties. Some of these difficulties, however, may be evaded by modifying the processing, so as to have to deal with, at each stage of manufacture, not more than one commercial product. It is in this direction that the trend of present technical and commercial development is turning. Future development technique will establish a close liaison between cement manufacture and the large chemical manufacturing industries, a conception which appears to be approaching realisation in some quarters.

The French Service des Poudres organisation is studying at the moment the conversion of the Miramas factory, which has been using the I.G. Farben process for the production of cement and sulphuric acid, to make possible the manufacture of alumina and sulphuric acid, with the ultimate possibility of adding cement manufacture.

### The Bayer Process

Several factories are projected elsewhere and in Rumania a factory in operation is working on the extraction of alumina from bauxites which are not of a suitable nature to be processed by the Bayer procedure.

Two factories were constructed during the war, one in Czechoslovakia and the other near Berlin; they produced alumina, using as raw material waste cinders from central power stations and also a super cement from the residual muds, by re-kilning.

By its large-scale employment of blast furnace slags, the cement industry shares a close bond with the metallurgical industries. The cement industry has, with

certain isolated exceptions, remained independent of the chemical manufacturing industries.

In actual cement manufacture or utilisation, very little recourse is made to the incorporation and use of chemical products. The true liaison between the two industries consists in the inherent possibilities of being able to manufacture, in parallel, both cement and chemical products in demand in bulk quantities.

It was around 1890 that the American Kayser put forward suggestions for the manufacture of cement, using as the starting raw material residues from the manufacture of alumina (by processing of clay). This would appear to be the first commercial proposal to combine the two industries of cement and chemical manufacture.

### Cement and Iron

Around 1910, F. Basset proposed obtaining simultaneously cement and sulphuric acid, by replacing the chalk used during the kilning of the cement with gypsum, the actual manufacturing process remaining an orthodox cement manufacturing technique. Some 20 years later he put forward the further proposal to manufacture simultaneously cement and pig iron, a technique which would integrate much more closely the cement and iron producing industries than the more simple utilisation of the waste blast furnace slags for cement manufacture.

Basset, in his proposal for sulphuric acid, demonstrated that decomposing calcium sulphate at a red heat with silica could not afford an economical solution to the manufacturing problem because of the high fuel consumption involved and the absence of any commercial value for the residual calcium silicate.

To overcome this, he proposed to mix the gypsum with clay, in proportions which would provide a product having the properties of Portland cement and which would make an important contribution to the economics of the manufacturing process. He proposed also to facilitate the reaction of the mixture, at a bright red heat, by an addition of finely powdered coal, which would serve to reduce a part of the sulphate.

The gypsum, clay and dried coal are

\* The full text of this article, of which this is a condensed form, was published in *Chimie et Industrie*, 62, No. 3.

ground to a fine powder, mixed and processed in a rotary kiln where calcination takes place; the carbon affects the reduction reaction. The sulphur dioxide that is given off is converted into sulphuric acid by the contact procedure and the lime combines with the clay, producing Portland cement.

Although quite simple in principle, the large-scale operation of this process gave rise to many technical difficulties and the commercial results obtained were insufficient in themselves to interest the French cement manufacturers before the 1914 war.

It was during this war that the systematic researches in this field of work were conducted in Germany by J. Mueller and finally the process was developed to the commercial stage. The first large-scale unit was started up at Leverkusen factory of the I.G. Farbenindustrie in 1916. The incentive then was the wartime lack of pyrites for the manufacture of sulphuric acid by the normal process. Subsequently the process was used in England, at Billingham, and in France at Miramas in 1939. The chief motive of most of this work, however, was to have available a process that would be capable of ensuring an adequate potential of sulphuric acid manufacture in national emergency. The fact that the process was then on a commercially economic basis made its adoption all the more desirable.

#### Complicated Plant

The technical difficulties associated with the process in relation to the manufacture of sulphuric acid arise because it is necessary to deal with very large volumes of gas poor in  $\text{SO}_2$  content. At the Miramas factory this content averages 8.5 to 4 per cent of  $\text{SO}_2$ . A fairly complicated plant layout is required.

On the cement manufacturing side of the process small variations in the course or atmosphere of the calcining stage can leave unaltered calcium sulphate in the product or will transform this into sulphide, to the detriment of the quality of the clinker produced.

In each case, the clinker obtained will be deficient in available lime; and, although differing opinions have been advanced on this aspect, it is a fact that cement clinkers produced by this process are invariably employed commercially as mixtures with cement clinkers produced by traditional methods. This appears, however, to be a matter of prudence rather than necessity.

In the case of the production of fused cements—*ciment-fondu*—the technical difficulties that arise in this connection are

less evident, because the influence of a slight variation in the quantity of the iron oxide that may pass into the clinker, presents less inconvenience.

Basset's original conception for linking iron and cement production was to fire in the rotary kiln an iron mineral, to which had been added the compounds necessary for the formation of a cement clinker. One object was to obtain a very pure iron, due to the purifying action of the very basic slag, the fusion of which would be rather pointless. During the course of the firing in a reducing medium, the fused metal exudes from the kiln mix, collects and is tapped off, while the slag, which is not fused, becomes a true cement clinker.

#### Regulation of Atmosphere

The manufacture of the iron was soon found not to be a practical proposition, but by adapting the process to produce a more fusible iron, the technique was finally developed to a satisfactory stage and a solution was found of difficulties, such as the attack on the refractories, the formation of bridging rings in the kiln and the problem of a suitable regulation of the atmosphere, which must be a reducing one.

The first factory to work this process was located at Moncada in Spain, and was followed shortly afterwards by the factory at Alhandra in Portugal. More recent and employing various improvements and modifications is the plant of the Smith concern in Denmark and the starting, comparatively recently, under the initiative of M. Caquot, of the new installation of the Biache-Saint-Vaast cement works, in collaboration with the Denain-Anzin group. From this it would appear that the liaison between cement and metallurgical industry has become fairly well established. These combined processes may now be broadly considered by classification according to the complexity of the processing.

#### Double Processing and End Products

The combined manufacture of cement and alumina covers several phases:

(1) The kilning of a silico-aluminous mineral mixture, with lime, so proportioned that as a final result, a mixture is obtained, which has the property of spontaneously breaking down in water and which consists of non-saturated calcium aluminates and of dicalcium silicate.

(2) Solubilisation of the calcium aluminates, in a very dilute solution of alkaline carbonate, without the silica entering into solution.

(3) Precipitation of the lime by sodium carbonate.

(4) Precipitation of the alumina by carbonic acid which regenerates the sodium carbonate.

(5) Correcting the composition of the residue and re-kilning to obtain cement.

The above process of Séailles, the main French protagonist of combined operations, has the considerable industrial advantage that the composition of the cement obtained can be regulated at will. It does, in fact, provide an extremely elegant solution of certain American conceptions regarding the formulation of special characteristic cements for specialised applications—such as the construction of barges and the construction of works in saline waters.

To give flexibility to the manufacture of cement and sulphuric acid, using gypsum as the raw material, the process can be combined with the manufacture of alumina, as outlined in the Séailles process. Then, the first kilning is arranged to give a sufficient decomposition of the calcium sulphate.

It might be anticipated that the presence

of the calcium sulphate would introduce untoward operating effects, either by the formation of ternary compositions, rendering the alumina insoluble, or because of the obstacles offered to the auto-pulverising effect, because of the presence of the residual calcium sulphate.

Actual working experience has shown that these misgivings are seldom justified in actual practice. The calcium sulphate does not enter into a ternary composition, and if the process is operated under suitable working conditions a self-disintegrating clinker is obtained quite readily, containing soluble aluminates. The clinker is washed to extract the alumina from it and the correctly proportioned residue is then kilned to produce Portland cement.

There is technically little doubt that in the same manner this technique could be adapted to yield cement, alumina and phosphorus or derivatives. The process, however, has not yet emerged from the laboratory stage, while the processes previously described have in various countries been operating on the industrial scale.

## Triethyl Phosphate: Additive, Catalyst and Intermediate

From A SPECIAL CORRESPONDENT

THE growing use, particularly in the U.S.A., of triethyl phosphate ( $C_2H_5O_3P$ ), recognises the marked versatility and low toxicity of this water white, mobile liquid. It is playing a useful part in processes as diversified as the preparation of diolefins, the polymerisation of vegetable oils, textile dyeing and the synthesis of insecticides. In the last connection it serves as an intermediate in the synthesis of the new insecticide, tetraethyl pyrophosphate, now replacing nicotine for the treatment of crops. The two organic phosphorus compounds, hexaethyl tetraphosphate and tetraethyl pyrophosphate, both of them rated highly as insecticides, are really mixtures of ethyl phosphates, of which the tetraethyl pyrophosphate is the most important.

Triethyl phosphate is being employed as a catalyst in the dehydration of glycols and olefinic alcohols for the preparation of diolefins, such as butanediol, pentanediol and hexanediol. These diolefins are colourless, stable, hygroscopic liquids of low volatility which are of particular interest for moistening and softening tobacco, regenerated cellulose, gelatine, paper, etc.

The polymerisation of coumarone, styrene, cashew nut oil, tung oil, etc., for the production of resinous compounds of interest for coatings and specialised pur-

poses is another of the directions in which triethyl phosphate has been valuable. Cashew nut resins have been used in the manufacture of insulation varnishes, cold setting compounds and cements, brake linings, industrial floorings and linings and in paper and cloth laminated materials.

A further successful application is as an additive to various lubrication oils for high pressure work. Lubricants containing triethyl phosphate are reputed to have comparatively flat viscosity temperature curves, low pour points and high flash points. The additive has only a very slight corrosive action on the common metals and the addition of 1 per cent of di-isobutyl ketone reduces this action appreciably.

In the textile industry triethyl phosphate is recommended as a dyeing assistant, the phosphate being miscible with water, ethyl alcohol, ethyl acetate, acetone, benzene, chloroform, xylene, isobutanol and castor oil. Its use as an ingredient of sizing formulations has been patented (U.S. Pat. 2,448,57/Sept. 7, 1948).

Triethyl phosphate is miscible with a number of common solvents, including water, and is partially soluble in mineral oil, paraffin, petrol, ethyl ether and carbon disulphide. It is remarkably stable and is only 0.8 per cent hydrolysed after 144 hours at 120° F.

## THE ELEMENTS OF COOLING WATER CONTROL—II

### Conveying Movement from the Thermostat

by LEO WALTER, A.M.I.Mech.E., etc.

**T**HERE are three principal ways of conveying movement from a thermostat: (1) direct, with or without some arrangement of mechanical leverage to increase the movement; (2) by means of a self-contained relay, and (3) by means of a relay bringing into operation some outside source of additional power, which, as has been seen, can be electricity or compressed air or liquid under pressure.

The rod and tube (metallic expansion) type thermostat offers little movement but plenty of power. It is possible, therefore, to increase the movement by an arrangement of levers. Besides, however, the loss of power which must be sacrificed to increased movement, leverage can introduce errors due to slackness of pivots and joints.

#### Magnified Movement

If the movement of the thermostat is equivalent to only one thousandth of an inch for a  $10^{\circ}\text{F}$ . rise in temperature the effect would have to be multiplied 12½ times to give the full movement of a 0.5 in. valve subjected to a temperature rise of  $100^{\circ}\text{F}$ .

It is not practicable to use a rod and tube type thermostat in industrial process work for operating directly anything other than a very small valve or an electric switch, but it is, of course, quite suitable for direct control of valves on domestic gas cookers and water heaters, and is widely used for those purposes.

A regulator with a bi-metal strip or coil thermostat produces more movement and more sensitivity than with a rod and tube thermostat, but much less power. These bi-metal thermostats are used principally for operating electric contact switches. For all practical purposes, the only application in which there is direct valve control of the heating medium is

the use of the coil type in some kinds of thermostatic mixing valves. With the thermocouple there is no movement, so there cannot be direct operation of a valve; relays are essential.

#### Relay Operated Regulators

Relay operated temperature controllers can, in a sense, be classed as "self-acting," inasmuch as they do not need any source of power which is not already being used on the job. The source of power is the pressure of the cooling medium. Fig. 5 shows how they operate. The space A is the air or liquid, the temperature of which is being controlled. B is the thermostat and C is a pilot valve. Any of the direct-acting devices we have described can be used as the pilot system.

The pilot-valve is in a by-pass D which is taken off the main supply line E. Thus the pilot valve is able to control (according to signals from its thermostat) the admission of pressure to the diaphragm of the main control valve F. From this valve there is also a constant leak through D1 back into the supply line.

If it is supposed that in A a cooling process is being carried out and the thermostat at this moment is calling for increased cooling effect. The pilot valve will be open and admitting pressure to the diaphragm of the main valve. So long as the opening through the pilot valve is greater than the leak through D1, pressure will be maintained on the diaphragm and the main valve will be held open.

As soon as the thermostat reacts to falling process temperature the pilot valve will close until its aperture is smaller than the leak through D1. Then the pressure will leak away from the diaphragm and the main valve will close, thus interrupting the flow of the cooling water. This is the on/off control action.

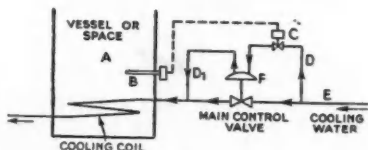


Fig. 5

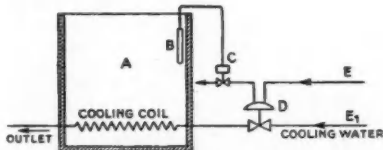


Fig. 6

The difference between these types and the last is that the relay mechanism brings into operation a separate source of power, such as air, water, electricity, or oil, to work the main valve, as shown in Fig. 6. A is the space being cooled; B the thermostat; C is the pilot valve. Through the small pipe E a supply of compressed air (or water) is connected to the diaphragm chamber of the main valve D.

From the diaphragm chamber there is also a leak through the pipe EI, but this time the leak is not constant. It is controlled by the pilot valve which, in turn, is operated by the thermostat. This time, when the thermostat is calling for increased cooling effect the pilot valve is closing the leak through EI, thus maintaining, through E, pressure on the diaphragm of the main valve and keeping the valve open. When the demand for cooling slackens, the reverse action takes place.

#### Action of Leak

Another modification is in connection with the leak. The compressed air, or whatever outside source of power is being used to operate the main valve, is controlled by the pilot valve, but there is also a branch to the thermostat. In this branch is a small hole which is covered and uncovered by the action of the thermostat.

When the hole is covered the full pressure of the compressed air is on the diaphragm. When the hole is uncovered there is a leak and consequent loss of pressure on the diaphragm of the main valve, which then shuts down on the heating medium. In power-operated temperature controllers, electricity is, of course, widely used as the source of power.

The thermostat itself operates electric contacts, which make and break the supply of current to the controlling device, which can be either an electro-magnetic (solenoid) valve or a motor-operated valve, or a motor starter for pump motors. In the solenoid valve, movement is obtained as a result of the electric current energising an electro-magnet which attracts an iron block on the end of the valve spindle, lifting the valve off its seat. When the current is broken by the action of the thermostat the magnet is de-energised and the valve drops back on its seat. (On/off method.)

In the motor-operated valve, the motor is usually a reversing one. The thermostat operates a two-way switch; in one position the motor drives the valve closed, and in the other it drives the valve open. In both cases, when the end of the stroke

is reached an internal switch in the motor changes over in readiness for the circuit to be re-made by the action of the thermostat when the temperature changes. (Floating method of control.)

There is a liquid-filled type of cooling water regulator having a rigid stem, containing a liquid-filled flexible bellows, which expands or contracts longitudinally with change of temperature surrounding the thermostat bulb. An adjustable bypass is provided in American types to enable a minimum flow of cooling water to be set, as required. Sizes from 0.375 in. up to 1.5 in. diameter are being made.

The capacity of the control valve depends on the pressure difference across the valve. A three-way control valve, working on a similar principle, has its thermostat bulb connected by means of a flexible small-bore tubing to the valve closing element and control valve. The

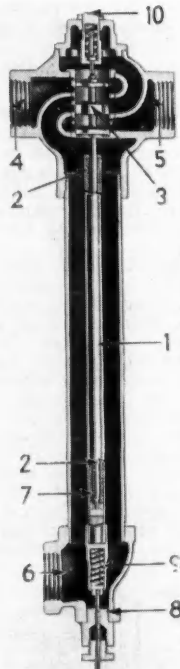


Fig. 7.—Self-actuated blender, or diversion valve: 1, Thermostat; 2, push rod; 3, piston valve; 4, valve body, cold inlet; 5, hot inlet; 6, outlet; 7, bellows tubing; 8, temperature setting; 9, relief spring; 10, cap.

valve then fulfils the function of a diversion valve, having one inlet on top, and two outlets. Used for Diesel engine cooling, one outlet leads to a cooler, the other to recirculation, during warming-up of the engine, when no cooling is required.

Fig. 7 shows a thermostatic three-way blender or diversion apparatus in sectional view. Used as mixer, 6 is the outlet, and 4 and 5 the respective inlets. Applied as diversion valve, 6 becomes the inlet and 4 and 5 the respective outlets. Movement of liquid-filled thermostat 1, located in the flow, is proportional to flow temperature, thus providing a gradual control movement of the piston valve 3. The application has already been explained.

There is a pneumatically operated mixing valve with diaphragm chamber, return spring and three-port valve. Control method applied is usually gradual (proportional), but pneumatic or hydraulic valves are sometimes used with a reset mechanism for heavy varying loads. (Reset method.)

#### Gradual Action

Among the gradual temperature regulators is a metal-expansion type of thermostat, acting by means of compressed air, or water under pressure, on a diaphragm control valve. The thermostat bulb is composed of an outer brass tube, which has an invar-rod fixed at its inner end. If the tube expands, due to increase of water temperature, the rod moves the flapper towards the air, or water, nozzle.

Opening or closing of the nozzle aperture is performed in a gentle, gradual manner. If the nozzle mouth is small, back pressure and branch air-line pressure to the control valve will be built up gradually. This gradual change of out-

put pressure from the control mechanism gently closes or opens the diaphragm valve by varying the pressure within the diaphragm chamber.

A hydraulic control system is used for very large valves. In this a mechanical impulse from a thermostat, pressure-stat or level-stat moves a small pilot valve in a relay mechanism, which in turn proportions hydraulic pressure above and below a piston in a power cylinder. Basically, the floating method of control is performed with this simple layout, but any control method can be achieved by additional features.

Fig. 8 shows diagrammatically how the gradual method of control can be achieved electrically. An electrical impulse of varying intensity, for example, derived from varying cooling water temperature, moves an electrical resistance within the control instrument. A proportionally operating electric relay moves a balancing potentiometer, which in turn produces rotation of a motor fitted to the control valve. The whole electric system produces proportional control, and the control valve moves according to the amount of impulse received from an electric immersion thermostat or thermocouple.

(To be continued)

#### Flanged Steel Valves

ADVANTAGES of ensuring interchangeability between American and British equipment have led to the production of British Standard 1570 (flanged steel plug valves for the petroleum industry).

The standard, which is based on the American Petroleum Institute Standard 600B, contains full details of the design and manufacture of plug valves, and incorporates tables giving dimensional detail and pressure-temperature ratings for classes 150 to 2500.

Details of the materials used are provided in appendices and drawings show typical plug valves as well as end flange facings, as required by the various classes of valves.

#### Speed Recording

Two types of instrument for universal speed measurements—the transmitter and the indicator or grapher—are described in the latest catalogue (485/5001) of Everett, Edgecumbe & Co., Ltd. An advantage of these speed meters is that they can be easily installed and may be placed at any reasonable distance from the actual machine, the speed of which is being measured.

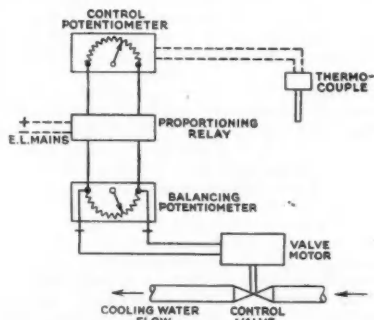


Fig. 8.

## Portugal's Chemical Industry

### Sulphuric Acid and Fertiliser Developments

CHEMICAL sections were well represented at the Lisbon Industrial Fair in November last and a serious attempt was made to convince buyers that in many branches of the chemical industry it was possible to procure from home production all their requirements, both in regard to quantity and quality. Whether that stage has yet been reached is open to doubt, but the participation at the fair of a large number of firms of relatively recent origin showed the trend of events.

#### Substantial Advance

Since the war, the Portuguese chemical industry has made substantial advance in at least two directions. Sulphuric acid production rose from 119,700 tons in 1938 to 203,826 tons in 1948. There are large reserves of pyrites in Portugal and the yield was 536,000 tons in 1948.

The other notable development, based on increased supplies of sulphuric acid, was that of superphosphate manufacture. The pre-war output of about 158,000 tons has now been nearly doubled, providing 302,845 tons in 1948. Imports of superphosphate have nearly been eliminated.

The Government has given effective encouragement to the production of nitrogenous fertilisers, with possibly more tangible results than have yet been produced by the similar policy in Spain. The development of cheap water-power has been vigorously carried on, and some 1500 million escudos have been spent on hydro-electric schemes.

#### Nitrogen Plants

The expenditure on nitrogen plants, planned up to 1952, is about 500 million escudos. Among the principal establishments is the Sociedade de Amoniao Portuguesa, at Estarreja in North Portugal, with a capacity of 50,000 tons ammonium sulphate a year, which started production in 1949. In 1950 it is intended to begin the manufacture of ammonium nitrate. Two other nitrogen firms are: Companhia Uniao Fabril in Central Portugal, and the Soc. Portuguesa de Azote in the south is awaiting completion of the hydro-electric works.

Large quantities of nitrogenous fertiliser have still to be imported. In 1947 these were valued at 88 million escudos, and included ammonium sulphate at 48

million escudos, with sodium nitrate (presumably from Chile) 33 million escudos. A factory for production of calcium nitrate and calcium carbide is being erected in Carnas de Senhorim by the Cia. Portuguesa de Fornos Electricos. Other projects by different firms include plant for calcium carbonate, sodium sulphide, caustic soda, zinc chloride, the higher alcohols, and insecticides.

It is hoped also to establish an important pharmaceutical industry and dispense with imports. There already exist some 85 small and medium-sized firms, and in two years, from 1946 to 1948, these have increased the value of their production from 160 to 208 million escudos. An earnest appeal for protective measures against foreign competition has been made to the Government in order that this industry may be more securely established.

#### Pharmaceuticals

Nothing is said, however, in this report (*Chimie et Industrie*, November 1949, 210) about the ambitious plans discussed a year or two ago for collaboration with Spain in developing all branches of the pharmaceutical industries. These included a thorough survey of the medicinal plant resources in both countries, the issue of a Pharmaceutical Codex—Hispano-Portuguesa—the training of pharmacists, and much else, which were to form the subject of a joint conference when these and other resolutions had been agreed.

The paint and varnish manufacturers are asking for increased tariff protection. Among new enterprises in this section is a modern factory owned by Fabrica de Tintas de Sacavem, that will specialise in rust-proof paints, heat-resistant aluminium paints, and varnishes. The plastics industry in Portugal is still in its infancy. A factory for the manufacture of phenol-formaldehyde resins and products started operation in August last year in Venda Nova, not far from Lisbon.

Production of insecticides and related materials is mainly limited at present to copper sulphate, output of which rose from 8000 tons in 1938 to 15,400 tons in 1948. An appreciable amount of arsenicals is also made, production reaching 1560 tons in 1948. Most of this was exported to Germany, Belgium, and England.



# The Chemist's Bookshelf

MANUAL OF SPECTROSCOPY. Theodore A. Cutting. Chemical Publishing Co., Inc., New York. Pp. vi + 220, Figs. 28. \$6.50.

This is a strange book. If sub-titles were still the fashion, it might almost have added to it the caption "or Spectroscopy (and many other curious aspects of Chemistry) in the home." Had it been radically pruned of its digressions, and published 15, or even 10 years ago, it would undoubtedly have been enthusiastically welcomed. There is about it, however, in these days of laboratories with elaborate departments devoted to quantitative spectrographic analysis, a flavour of irrelevant curiosity which is not without nostalgic appeal. Often useful tips in general chemistry are picked up from very old textbooks, and it is as least as likely that many will find valuable information in this book. There is a lot of truth in the author's contention that "spectroscopic equipment should be in every school and laboratory," even though his claim that present-day instruments are low in cost cannot be accepted so readily.

After a brief historical and theoretical review (of about intermediate standard), light sources are dealt with in the second chapter and spectroscopes in the third. These two chapters will be of interest to every small laboratory which has not got adequate simple equipment, since it describes the complete construction of everything that is essential, starting with a prism and a few lenses or a grating replica, together with (almost) the proverbial string and sealing wax. The author claims, for example, that the total cost for a concave replica spectrometer, giving a 10 or 12-in. spectrum, need not exceed \$15 or \$20. Chapter IV deals in an elementary fashion with the practice of spectroscopic analysis and will enable the amateur who remembers that it is the first, and not the last, word on the subject, to come to grips with the technique. Chapter V deals with what is clearly the author's hobby-horse, the spectroscope in mineralogy, and contains much extraneous information, such as a table of crystal forms and a scale of hardness.

It is in Chapter VI, which is entitled

"Characteristic Lines of the Elements," that we are most aware that we are getting the catch from a very widely cast net. The characteristic lines are given, element by element, in alphabetical order. But in addition, we have an embarrassing wealth of "additional information." The section on Iodine is typical of the whole chapter, giving historical notes, a selection of physical and chemical properties which have no apparent connection with spectroscopy, and the price of crude iodine at that time (\$1.92 per lb.).

A useful set of outstanding arc lines, arranged element by element and supplementing the lines listed in the detailed part, is followed by an unusual wavelength table-chart, which attempts to give a metrical guide to the lines, *seriatim*, from 6900 to 3900 Å. The precise advantages of the form chosen over a straight record are not clear, but the list is a valuable one, and it is only to be regretted that the table ignores the very important ultra-violet region. This region, fortunately, is not neglected in the lists arranged by elements. A few unimportant textual mistakes were noted and the caption to Fig. 28 certainly does not describe what is shown. Illinium and masurium are included as such in the detailed section on the elements.

The book can be recommended, with these reservations, as a useful and sometimes exhilarating introduction to the technique of spectroscopy. It is possible that the reviewer may one day be able to determine the reason for the inclusion in the bibliography of "Manual of Clinical Therapeutics," by W. C. Cutting, M.D.—C.W.L.

## Radioactive Hazards

PROBLEMS concerning the protection of personnel, design of laboratory and equipment, etc., are discussed in a handbook "Safe Handling of Radioactive Isotopes" recently issued by the U.S. National Bureau of Standards. The main objectives are stated to be to prevent ingestion, inhalation, interstitial or other modes of entry into the body, and to reduce the amounts of external irradiation.

## HOME

### Opportunity for New Products

A new feature of the Engineering Centre, Ltd., Glasgow, is the introduction of a "latest products" section, which enables firms to display their most recent developments for one month, free of charge.

### Coal Production

Britain's total coal output during the week ended February 11 was 4,342,300 tons, compared with 4,288,600 tons in the previous week and 4,311,100 tons in the week ended February 12 last year.

### Freer Trade with Sweden

Chemicals and metals of a wide variety form the largest section of goods for which Sweden has announced that licences will be granted automatically from the United Kingdom, as well as from most other member countries of the OEEC.

### Steel Output in January

Steel production in January was at an annual rate of 15,783,000 tons, compared with 15,002,000 tons a year ago. This, claims the British Iron and Steel Federation, is the highest production rate ever achieved in January.

### Water Survey Resumed

The Government has decided to resume the work of the Inland Water Survey which was interrupted during the war. Mr. N. J. Pugh, vice-president of the Institution of Water Engineers, is a member of the re-constituted committee.

### Future of Cement Industry

A letter to all Parliamentary candidates has been sent by the Associated Portland Cement Manufacturers, Ltd., stating six reasons why the cement industry should not be nationalised. Points made in the letter are cheapness of cement in Britain, higher productivity per worker than in U.S.A., lack of strikes, and schemes for profit-sharing.

### N.T.P. Interest in Australia

National Titanium Pigments, Ltd., is acquiring a small interest in Zircon Rutile, Ltd., Melbourne, Victoria. At the last annual meeting of the Australian company it was stated that the directors had been negotiating with the British company to explore the possibility of manufacturing certain chemical products in Australia. Research on titanium oxide pigment had been carried out, and progress had been made by the Australian company in investigating the prospect of producing zirconium sulphate and neon powders.

### Fire Closes Glass Works

As a result of fire early on February 12 at Bateson Bros., glass bottle manufacturing plant, Spekeland Road, Edge Hill, Liverpool, some 50 people will be temporarily out of work. A furnace burst and molten glass overflowed into a basement. The damage will entail a complete shutdown until repairs have been carried out.

### U.K. Exports in January

United Kingdom exports in January are provisionally estimated to have reached the record of £175.8 million. This is £15.5 million higher than the previous record in November and £27.1 million above the monthly average for 1949. Imports in January were also higher, and the provisional figure of £201.2 million was only £0.5 million below the record figure of last June. Re-exports in January amounted approximately to £5.8 million, thus the excess of imports (valued cif) over total exports (valued fob) was £19.6 million. This was £16.2 million (45 per cent) below the monthly average for 1949.

### A Modern Road System

A complete modern road system for Britain is a matter of concern to everyone, whether industrialist or private individual. "Roads—The New Way," a 55-page book, the latest publication of the British Road Federation, contains a pictorial survey of road-building activities, in town and country, in many parts of the world.

### Carbon Black Finance

ONE of the impediments to the full development of the carbon black industry in the United Kingdom has been relieved by the decision, which the ECA has announced, to increase from \$850,000 to \$2,025,000 the amount of currency for which convertibility will be guaranteed in respect of the undertaking by Godfrey L. Cabot, Inc., to establish an undertaking at Ellesmere Port, Cheshire.

The parent company, in Boston, Mass., will subscribe part of a larger investment in capital stock, and for the rest will guarantee local bank borrowings. Construction of the plant, which is planned to produce 100,000 tons of carbon black a year (THE CHEMICAL AGE 60, 302), was begun last June and is expected to be finished and in operation by June this year.

## Technical Publications

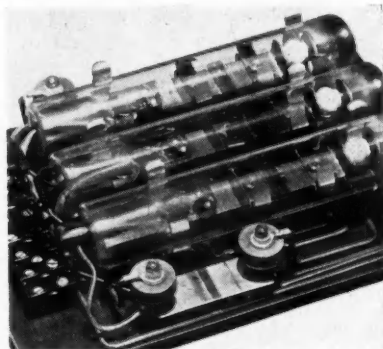
TANTALUM'S special interest to chemical engineers is derived almost entirely from its resistance to chemical attack. The properties, production and applications of this metal are described by G. L. Miller in the current issue of "Murex Review," published by Murex, Ltd., Rainham, Essex. The other main feature is an article by F. W. Salt on the electro-deposition of tungsten.

PROCEEDINGS of the Chemical Engineering Group of the Society of Chemical Industry for 1947 (Vol. 29) are now available. Papers include: "Aeronautics and the Chemical Engineer," by Sir Ben Lockspeiser; "Manufacture of Contact Sulphuric Acid from Arsenical Pyrites," by H. C. Millett; and "A New Process for the Recovery of Ethylene from Coke Oven Gas."

DEPOSIT-welded tools can now be added to solid cutting and electrically butt-welded high speed steel tools. Welding technology has been carried a stage further by the development of the Athy-weld process by which it is claimed that a greater cutting efficiency can now be obtained from the deposit than from the original parent metal. The process and its applications are described in the current issue of "Edgar Allen News," published by Edgar Allen & Co., Ltd., Sheffield.

SIMULTANEOUS determination of refractive index and melting point has been suggested as a rapid and convenient method for the identification of substances with melting points below 200° F. Three American doctors have collaborated in the determination of the melting points and refractive indices at the melting point for many of the gums, waxes and resins normally encountered in a pharmaceutical laboratory. These constants appear in a report published in the Journal of the American Pharmaceutical Association, Scientific Edition (38: 495, 1949). The report includes also a description of the instrument used for the determinations, a refractometer supplied with a heating head, and the technique involved.

VACUUM switch tubes for relay links have formerly been supplied either loose or mounted with accessory equipment in Bakelite boxes. Sunvic Controls, Ltd.,



The new Sunvic multiple assembly for relay services

has now designed complete panel units of from one to three standard Sunvic Hot-wire tubes mounted on an insulated base plate. This arrangement, type PN relay, is described in the company's latest literature.

CHEMICAL structure and properties of the principal groups of plastic materials employed in the electrotechnical industry are described by J. C. Derksen and M. Stel in the main article of "Philips Technical Review" (Vol. 11, No. 2), and there is an investigation into the problems of lighting a dark room for developing photographic negatives.

CONFIRMATION of the value of the Training Within Industry scheme, sponsored by the Ministry of Labour and National Service, is contained in "Follow-Up," a booklet now issued by the TWI Association, North-West Region. The Heavy Engineering and Chemicals and Oils and Fats sub-committees formed in 1948 submitted some additional recommendations and appendix material and reveal, on the whole, a high degree of acceptance of the TWI principle.

NEW developments in protective clothing including PVC gloves for women workers and a fashioned mitt formed to provide a natural position for the finger tips are announced by James North & Sons, Ltd., Hyde, Cheshire.

## PERSONAL

## Trade and University Appointments

NEW officers of the British Non-Ferrous Metals Research Association have been elected as follows: the HON. R. M. PRESTON, chairman of council, in succession to SIR JOHN GREENLY; MR. F. C. BRABY, vice-chairman and honorary treasurer; and DR. MAURICE COOK, chairman of the research board.

Shell Chemicals, Ltd., announces that MR. S. W. FARRINGTON will be taking over its Scottish division, the office of which is at 28 St. Enoch Square, Glasgow, in succession to MR. C. DUCKWORTH, who becomes manager of its midland division, at King Edward House, New Street, Birmingham. Mr. Duckworth succeeds MR. J. A. PORTER, who is taking up a post at the head office of Shell Chemicals, Ltd., in London.

A Chair of Brewing and Industrial Fermentation is to be established at the Heriot-Watt College, Edinburgh. DR. I. A. PREECE has been appointed the first professor. The doctor, who is 42, is editor of the *Journal of the Institute of Brewing*, and has carried out researches into problems connected with fermentation and brewing.

MR. NORMAN BOURNES, assistant works manager at Dunlop's Cambridge Street works, Manchester, has been appointed works manager there in succession to MR. GEORGE LIVINGS, who has retired after 53 years' service.

Among the appointments in the University of Manchester recently announced are: reader in pharmaceutical chemistry, DR. K. BULLOCK; lecturers in physics, J. A. NEWTH; lecturer in chemistry, M. C. WHITING.

MISS MARGARET ROBERTS, aged 24, food research chemist, a Conservative and one of the youngest election candidates, handed in her nomination papers at Dartford last week.

MR. ISAK LEVIE (commonly known as JACQUES POLAK) advisory director of Lever Bros. & Unilever, Ltd., domiciled in Holland, left estate in England valued at £45,553 gross, net personalty £44,644.

DR. JUAN BAUTISTA DE NARDO, professor of metallurgy in the University of La Plata, Buenos Ayres is on a visit to Britain.

## THE TECHNICAL PRESS

## A Widening Service to Industries

AUTHORITATIVE recognition was paid in London last week to the useful service rendered by the trade and technical journals of Benn Brothers, Ltd. (proprietors of THE CHEMICAL AGE). The occasion was the annual dinner for directors and staffs at Grosvenor House, which more than 400 attended.

The courage with which the founders of the group, and notably Sir Ernest Benn, had met and overcome early difficulties was recalled by a leader in the field of technical and other publications, Lord Camrose, who proposed the toast of the firm.

In a reference to the wide range of the Benn publications, Lord Camrose said trade journals played a big part in the life of the nation. The British people depended on commerce more than most other nations, and he was certain the merchant and the trader needed the advice and help provided through the media of trade and technical journals. "You are now in a very prosperous and happy condition," he concluded. "I believe you are entitled to have very great confidence in the future of your firm."

Mr. Glanvill Benn, chairman of Benn Brothers, Ltd., who presided, acknowledged that his father, Sir Ernest Benn, had succeeded in creating an ever-widening circle of trade and technical publications which were doing great public service. The chairman conveyed a message of good wishes and encouragement from Sir Ernest Benn and Lady Benn gave an assurance of his progressive recovery from the illness which had enforced his absence.

Mr. Norman French proposed the toast of the guests and Lord Stansgate replied.

## Obituary

THE death has occurred of DR. GEORGE S. CRUIKSHANKS, 72, a lecturer in technical chemistry at the Royal Technical College, Glasgow, between 1907 and 1946, who had published a number of papers on fuel technology. He was professor of chemistry at the Anderson College of Medicine, Glasgow, 1919-1947.

The death has occurred of MR. JAMES LAING, a former chairman of the I.C.I. explosives division at Stevenston, Ayrshire (now the Nobel division, with head office in Glasgow and main factory at Ardeer). Mr. Laing, who was 71, retired eight years ago.

DR. JAROSLAV KULHANEK (see page 250)

## OVERSEAS

### £1 Million Oil Project Ended

Drilling at an oil well at Lakhra, in the province of Sind, which has cost about £1 million, has been abandoned as uneconomic by the Burmah Oil Co. (Pakistan Concessions), Ltd. It is reported that large volumes of water were encountered at a depth of 12,660 ft. It is uncertain whether further drilling will be started in the Sind, or whether investigation here should be abandoned.

### New German Anti-Corrosive

The Sinoxal GmbH, Geesthacht an der Elbe, is reported to have taken out patents for a new anti-corrosive, Sinoxal 5010, which is claimed to resist alkalis and weakly oxidising acids. On iron, it is stated to form a completely fast-hardening, elastic and fire-proof layer, and described as being similar to enamel. Capacity of the works, using domestic raw materials only, is to be 10 tons per day.

### Aid for Swedish Zinc Mining

A loan not to exceed \$350,000 has been approved by the ECA to assist the AB Zincgruvor Co., of Sweden, to purchase special mining equipment in the U.S.A. for the zinc-lead-copper mines near Falun. The Swedish company, owned by Skandinaviska Banken, will raise about \$2 million to complete the expansion programme. The U.S.A. will be paid in the form of zinc and lead metals.

### Alsace Potassium Mining

Output of crude potassium from mines in Alsace amounted last year to 5.28 million tons, as compared with 4.46 million tons in 1948, 4.17 million tons in 1947, and an average of about 3.25 million tons in the immediate pre-war years. The K<sub>2</sub>O-content rose to 896,000 tons, against 768,000 tons last year, and 716,000 tons in 1947. The current expansion programme seeks to increase output by 1957 to 1.2 million tons, in terms of K<sub>2</sub>O.

### New German Wood Preservative

A new product, which is claimed to render wood proof against fire, rotting and insect destruction, has recently been perfected by the Chemische Werke Albert, at Wiesbaden-Biebrich, Germany. It consists of a special salt with a basis of ammonium fluoride, and is said to have extremely good diffusion power and not to interfere with the natural respiration of wood. One kg. is stated to be sufficient for the triple protection of about 7 sq. m. of wood.

### Austrian Graphite Production

Output of raw graphite in Austria amounted last year to 14,054 metric tons, compared with 10,718 tons in 1948. Refined graphite production rose from 9640 to 13,026 tons.

### German Steel Industry

Considerable progress has been made in the work of reorganising the German steel industry and all the shares of the 25 new holding companies have now been allocated to the German Steel Trustee Association, states the Allied Combined Steel Group.

### Cyanite Deposits in Austria

A cyanite deposit which has been discovered in the Austrian Tyrol is reported to be the only known occurrence in Europe justifying exploitation on a commercial scale. Its extent is believed to make possible an output which would not only cover Austria's estimated requirements of about 2000 metric tons per annum but would leave a substantial exportable surplus.

### ECA Assistance for French Chemical Plant

The ECA has approved a recovery project for construction of a chemical plant at L'Etang de Berre, France, for La Société Naphtachimie, to produce a number of organic chemicals, some constituting raw materials for plastics, synthetic fabrics, varnishes, lacquers, photographic supplies and similar products. The project will cost \$13,853,000, of which ECA will provide \$853,000.

### Swiss Nylon

A Swiss firm, Holzverzuckerungs AG, Ems, is reported to have decided to manufacture nylon, following research work carried out since shortly after the war ended. Plant for the production of the basic chemical and textile materials is under construction and the new product—Grilon—is expected to be able to compete in the world market. Production should start early in 1951.

### Israel Plans 60,000-ton Rolling Mill

Plans are being developed by Solel Boneh, Ltd., a diversified industrial manufacturing organisation in Israel, to construct near Haifa the first steel rolling mill with an annual capacity of 60,000 tons. H. A. Brassert & Company, New York, consulting engineers, are collaborating. Solel Boneh already operates a cement plant, glass works, brick works, foundry and fabricating shop.

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## Next Week's Events

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### MONDAY, FEBRUARY 20

#### Electrodepositors' Technical Society

London: Kingsway Hall, W.C.2, 5.30 p.m. R. Wall: "Bright Nickel and Chromium Plating—Batch Production."

### TUESDAY, FEBRUARY 21

#### The Chemical Society

Leeds: University, 5 p.m. Scientific films. 6.30 p.m. (with Leeds University Chemical Society). Dr. H. D. Springall: "Some Recent Applications of Dipole-moment Measurements to Molecular Structure."

#### Institute of Petroleum

Manchester: Engineers' Club, 6.30 p.m. Symposium: "The Petroleum Industry as a Career."

### WEDNESDAY, FEBRUARY 22

#### Society of Chemical Industry

London: Royal Institution, Albemarle Street, W.1, 6.30 p.m. Dr. H. Baines: "Photography in the Service of the Scientist."

#### Manchester Literary and Philosophical Society

Manchester: Portico Library, Mosley Street, 5.45 p.m. Dr. E. G. Edwards: "Some Aspects of Freedom for Science."

#### The Plastics Institute

London: Waldorf Hotel, Aldwych, W.C.2, 6.30 p.m. A. A. Tomkins: "Advances in Moulding Technique."

#### The Society of Visiting Scientists

London: 50 Old Burlington Street, W.1. 7.30 p.m. Discussion: "The Planning of Agricultural Research in Great Britain."

### THURSDAY, FEBRUARY 23

#### The Chemical Society

Manchester: Engineers' Club, Albert Square, 6.30 p.m. (with RIC and SCI). Prof. E. R. H. Jones: "Research in Progress in the Organic Chemistry Department of Manchester University."

Nottingham: Lecture Theatre, Department of Chemistry, University, 6.30 p.m. Prof. A. R. Todd: "Synthesis in the Nucleotide Field."

#### Incorporated Plant Engineers

Sheffield: Grand Hotel, 7.30 p.m. A. V. Shaw: "Non-Ferrous Metals."

#### The Institute of Metals

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. C. E. Ransley: "Gases in Metals."

### FRIDAY, FEBRUARY 24

#### The Chemical Society

Glasgow: Royal Technical College, 7 p.m. Local annual general meeting and reading of original papers.

#### Oil and Colour Chemists' Association

Manchester: Chemistry Lecture Theatre, The University, 6.30 p.m. Prof. M. G. Evans: "The Design of Experiment."

#### ASLIB (Northern Branch)

Huddersfield: Technical College, Queen Street South, 2.30 p.m. Mrs. M. Dean: "The Organisation of a Small Industrial Library."

#### Lecture Postponed

The Royal Institute of Chemistry announces that the meeting arranged for Wednesday, February 22, at Reading University has been postponed until Wednesday, March 8, when Dr. G. W. Scott Blair will speak on "Recent Advances in Rheology."

### Royal Society Lectures

THE following lectures for 1950 have been announced by the Royal Society.

The Bakerian Lecture will be delivered on Thursday, May 4, by Prof. P. W. Bridgman, Lyman laboratory of physics, Harvard University, U.S.A.

In June there will be two lectures: the first, the Croonian, by Prof. F. M. Burnet, director of the Walter and Eliza Hall Institute, Melbourne, Australia, and the second, the Ferrier, by Prof. J. Z. Young, professor of anatomy, University College, London.

The first Leeuwenhoeck Lecture founded in 1948 by a bequest from Mr. George Gabb "for an annual lecture in the field of microbiology," will be given by Sir Paul Fildes on November 9.

Prof. F. J. Cole, Emeritus Professor of Zoology, University of Reading, will deliver the Wilkins Lecture on December 14.

### Liege International Fair

Preparations are now well under way for the International Fair to be held at Liege from April 29 to May 14. The area of the fair will be twice as large as last year's and exhibits will cover all aspects of mining, metallurgy and mechanical and electrical engineering.

## IN THE COURTS

## IMPORTANT RULING ON PATENTS CLAIMS

*Lords Reject Appeal by May & Baker and Ciba*

**BY** a majority decision, the House of Lords last week ruled that the petition by May & Baker, Ltd., and Ciba, Ltd., to amend their letters patent relating to sulphanilamide drugs should not be granted and sustained the application of Boots Pure Drug Co., Ltd., that the original letters patent should be revoked. The Law Lords dismissed the appeal by the first two companies against the decision of the Court of Appeal, which had affirmed judgment of Mr. Justice Jenkins in favour of the original petition by Boots Pure Drug Company.

Earlier, May & Baker and Ciba had sought leave to amend the specification for which letters patent were granted on May 24, 1946, so as to restrict the claims to sulphathiazole and sulphamethylthiazole. The specification had related to "the new para-amino benzene sulphonamide thiazoles" which were computed to comprise potentially several million compounds. This was a result of research by the two companies aimed at improving the possible uses of sulphanilimide, the great therapeutic value of which against streptococcal infections had been established in 1935. The motion to restrict the claims was refused in January, 1948, by Mr. Justice Jenkins. That decision was affirmed by the Court of Appeal on the ground that the specification as amended would claim an invention substantially different from that claimed in its original form, and that the Court had no power to allow the proposed amendments.

**Insufficiently Specific**

Lord Simmons, ruling, in the latest hearing, that the appeal should be dismissed, said there was no hint in the original specification that the exemplary drugs, sulphathiazole and sulphamethylthiazole, were essentially distinguishable from any other members of the vast group within which they fell, or that they had some peculiar characteristic which gave them a therapeutic value. No one could fairly read the document without concluding that their therapeutic value was derived from a generic quality; they illustrated the invention just because they had that quality. No separate claim was made for the manufacture of those two specific drugs, or for the drugs themselves.

The question was whether the invention claimed by the amended specification was different from, and, if so, substantially different from, that claimed by the un-amended specification. He emphatically held the view that it was plain common-sense that the inventions were different.

**General Ruling**

It had been contended on behalf of the appellants "that to limit the claims of a specification to the only form of the invention specifically described in the un-amended specification and therein claimed in general terms cannot be to claim a substantially different invention." But it was to beg the question to be determined to say that, in every case in which the patentee had stated the nature of his invention in wide and general terms and then given an illustration of it, he could shift his ground and claim that his invention was not the general but the particular. He could do so only if they were the same inventions.

That problem was to be solved by the consideration of the facts of each case. The Court in the consideration of each question was not to be precluded from inquiring whether the illustration given by the patentee was in fact an illustration of the invention which he had generally described.

Lord Normand and Lord MacDermott agreed with Lord Simmons's decision.

**Dissenting Judgment**

Lord Morton dissented. He considered that the proposed amendment could be regarded as an amendment by way of disclaimer and was not prohibited by the proviso to section 22 of the Patents and Designs Acts, 1907-46. He regarded the two drugs as being the preferred embodiment of the invention described in the specification. It seemed to him that the appellants were not claiming a substantially different invention, but something which was part of the wide invention originally claimed.

Lord Reid said that he thought that the proposed amendment was competent. But it did not necessarily follow that the appeal must succeed. He was unable to agree that the appeal should be dismissed on the grounds which their Lordships had stated.

## Law and Company News

### Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

#### Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary but such total may have been reduced.)

**LAUTARO NITRATE CO., LTD.,** London, E.C. (M., 18/2/50.) December 22, mortgage to La Caja de Accidentes del Trabajo, Santiago, Chile (formerly Labour Accidents Department of National Savings Bank, Santiago, Chile) supplemental to mortgage dated May 4, 1938, and a mortgage dated December 30, 1940, and January 18, 1941, securing 4,321,000 Chilean pesos inclusive of 3.5 million pesos secured by said mortgages; charged on property charged by original mortgages. \*£2,645,767. January 12, 1949.

**MANCHESTER OIL REFINERY, LTD.,** (M., 18/2/50.) January 16, deed of indemnity, and debenture securing to G. Tugendhat, London, all sums due or to become due to the holder but not ex. £40,000; general charge. \*£650,000. June 28, 1949.

**MILNER & COKE, LTD.,** London, S.E., manufacturers of disinfectants etc., (M., 18/2/50.) January 12, debenture securing to H. E. Lewis, London, all sums which the chargee may be called upon to pay under a guarantee; general charge. \*Nil. July 28, 1948.

**VISCOSE DEVELOPMENT CO., LTD.,** Bromley, Kent (M., 18/2/50.) January 9, £135,000 debenture stock, part of an amount already registered. \*Nil. May 18, 1949.

#### Satisfactions

**CLASSIC CHEMICALS, LTD.,** Radcliffe. (M.S., 18/2/50.) Satisfaction January 21, of charge registered November 5, 1946, to the extent of £2000.

**TANKS & LININGS, LTD.,** Droitwich. (M.S., 18/2/50.) Satisfaction January 16, of charge registered September 19, 1947.

#### Change of Name

The name of Tecto Products, Ltd., has been changed to Factron Products, Ltd.

### Company News

#### Borax Consolidated, Ltd.

A final dividend of 6 per cent, less income tax, plus a bonus of 2½ per cent on the deferred ordinary stock, has been recommended for the year ended September 30, 1949. The company's net profit, after taxation, was £408,667.

#### Monsanto Chemical Company

Net earnings of the Monsanto Chemical Company (U.S.A. and Canada) in 1949 totalled \$17.24 million, as compared with \$18.04 million in 1948. Total sales rose slightly from \$161.6 million in 1948 to \$165.9 million last year.

### New Registrations

#### Catholic Protection Co., Ltd.

Private company. (478,089). Capital £500. Manufacturers of anti-corrosion, filtering and purifying apparatus and plant, water softening plant and materials, etc. Directors: P. E. Heathfield, A. L. Vandervelde. Reg. office: Oak Tree Lodge, Oxted, Surrey.

#### Longley Chemicals, Ltd.

Private company. (478,044). Capital £2000. Manufacturers of chemicals, gases, etc. Directors: C. A. Longley, P. A. Blundell, G. N. Ommanney. Solicitors: Yarde and Leader, 1/2, Gray's Inn Place, W.C.1.

#### Ralph Nye, Biddle & Co., Ltd.

Private company. (478,061). Capital £10,000. Dealers in chemicals, colours and driers, etc. Directors: R. L. F. Nye, Mrs. A. Nye, H. A. Tobias. Reg. office: Grand Buildings, Trafalgar Square, W.C.2.

#### R. Sarant & Co., Ltd.

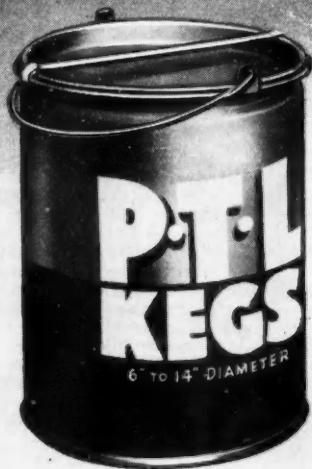
Private company. (478,202). Capital £5000. Manufacturers and refiners of oils and oil substances of all kinds, chemicals, spirits, gums, fats, etc. Directors: R. Sarant, G. de M. Logsdon. Reg. office: Sardinia House, Sardinia Street, London, W.C.2.

#### Sunray (Birmingham), Ltd.

Private company. (477,990). Capital £3000. Objects: To adopt an agreement between Sun-Ray (Bleach), Ltd., and A. Plummer and G. Gammon; and to carry on the business of manufacturers of bleaching and cleaning products, washing and cleaning powders, soap, etc. Directors: N. A. Plummer, D. G. Gammon. Reg. office: 47, Temple Row, Birmingham.



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## The Stock and Chemical Markets

**T**HERE has been little improvement in the volume of business in stock markets affected by General Election uncertainties. The feature in industrials was a further moderate rally in shares of companies which would not be threatened with nationalisation if there were a change of Government.

Imperial Chemical have been more active around 41s. 4½d., attention being drawn to the attractive yield and to expectations that the 10 per cent dividend will be maintained. Monsanto 5s. ordinary were firm at 50s. 7½d. helped by news of the group's Indian plans. Fisons, however, receded further to 21s. 10½d. Laporte Chemicals 5s. ordinary have shown firmness at 9s. 6d., and Brotherton 10s. shares were 19s. 4½d. Albright & Wilson were 28s. 9d. British Glues & Chemicals 4s. shares held firm at 20s., and British Oxygen rose further to 92s. 6d. in anticipation of the announcement of excellent results for the past year and talk of a substantial issue of shares, probably on bonus terms, to shareholders.

Borax Consolidated, after receding to 54s. 6d., firmed up to 55s. on further consideration of the financial results. Turner & Newall were good again, changing hands up to 79s. 3d., sentiment still being influenced by the chairman's statement that it is not intended to continue dividend limitation.

Associated Cement have rallied to 73s. 6d. and British Portland Cement to 71s. 10½d. Among paints, Lewis Berger showed firmness at 25s. 6d. Pinchin Johnson at 36s. 7½d. have held their recent improvement, in expectation that the dividend may be maintained, despite the larger capital. Swedish Match reflected the general local advance, rising to 49s.

The 4s. units of the Distillers Co. have been fairly steady at 17s. 1½d., De La Rue were 23s., British Industrial Plastics 2s. shares 4s. 7½d., and British Xylonite 57s. 6d. Metal Box shares have been favoured up to 90s., the market assuming that this is an instance where these would be good prospects of a higher payment for shareholders if dividends limitation were abolished. Elsewhere, however, General Refractories have eased to 22s. 9d.

Glaxo Laboratories have been firmer at 14s. 10½d., and shares of other companies which have distributed share bonuses in recent months were also inclined to strengthen.

United Steel have improved to 27s. 4½d., Stewarts & Lloyds to 53s. 6d. and Dorman

Long to 32s. 3d., all of which are well below the take-over prices fixed in the event of nationalisation.

Boots Drug have improved to 48s., Triplex Glass kept steady at 18s., and Lever & Unilever firmed up to 40s. 6d. Oil shares, after firming, were inclined to ease on the news that the U.S.A. is still dissatisfied with Britain's compromise on the question of oil imports from dollar countries. Shell eased to 63s. 9d., and weakness of Ultramar Oil at 7s. was a feature.

### Market Reports

**T**HERE have been no changes of importance in the market for industrial chemicals and prices have remained steady with a firm undertone. An active export is reported and home consumers' delivery specifications have covered good quantities, but strictly new business has been on a moderate scale and mostly to meet spot or nearby requirements. Reports indicate that buyers are awaiting the results of the General Election before placing further contracts. The supply position in the soda products section remains fairly easy with chlorate of soda firm on a steady demand. The potash compounds remain on a firm price basis and there is a ready outlet for most items. With the possible exception of xylol all the coal tar products are in plentiful supply and the tone generally has been quiet and unchanged.

**MANCHESTER.**—From the point of view of actual deliveries, steady trading conditions have been reported in Manchester during the past week. The cotton, woollen and other textile industries are calling for substantial contract deliveries of a wide range of heavy chemicals, and similar instructions from the majority of the other principal consumers are reported to be circulating satisfactorily. New bookings on home trade account and also for export have been fairly substantial. There has been little change in the price position. A steady movement of supplies of tar products is reported, with cresylic acid still relatively quiet.

**GLASGOW.**—The Scottish chemical market has been fairly active during the past week, and the volume of turnover has been higher than for some time. Trisodium phosphate is at present in short supply owing to recent heavy bookings. The export position has also shown considerably more activity and some very good orders have been booked for the Continent.

## Patent Processes in the Chemical Industry

### Complete Specifications Accepted

Process for the flocculation of solids in aqueous suspensions.—Directie Van De Staatsmijnen in Limburg, Handelend Voor En Namens Den Staat Der Nederlanden. Oct. 18 1946. 634,440.

Methods and agents for preparing aqueous solutions of water-insoluble substances.—Taubmans, Ltd. Jan. 6 1947. 634,499.

Chemical reactions involving the evolution of fumes of oxides of nitrogen.—Johnson & Sons' Smelting Works, Ltd., and T. Critchley. Feb. 4 1948. 634,578.

Manufacture of metal nitrates.—Johnson & Sons' Smelting Works, Ltd. and T. Critchley. Feb. 4 1948. 634,579.

Process and catalyst for the dehydrogenation of olefins.—A. Abbey. (Dow Chemical Co.) Feb. 28 1947. 634,391.

Process and catalyst for the dehydrogenation of aliphatic mono-olefins.—A. Abbey. (Dow Chemical Co.) Feb. 28 1947. 634,580.

Emulsion polymerisation.—Wingfoot Corporation. March 3 1947. 634,503.

Production of acetals of  $\beta$ -haloaldehydes.—General Aniline & Film Corporation. April 16 1947. 634,581.

Process for the production of iron powder.—International Minerals & Chemical Corporation. April 18 1947. 634,582.

Electrodeposition of nickel from an acid bath.—Udylite Corporation. April 19 1947. 634,394.

Process of refining chloral by distillation.—L. E. Jones. (Shawinigan Chemicals, Ltd.) April 22 1947. 634,398.

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Further particulars and application forms from the SECRETARY, Civil Service Commission, Scientific Branch, 7th Floor, Trinidad House, Old Burlington Street, London, W.1. Applicants should state their date of birth and quote No. 2951. Completed applications must be returned by 7th March, 1950.

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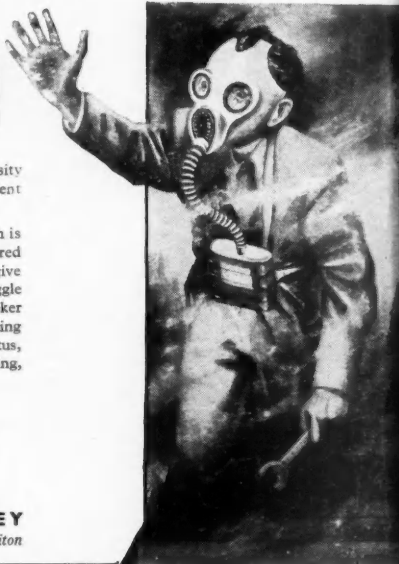
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